

MARINE REVIEW.

VOL. XV.

CLEVELAND, O., APRIL 29, 1897.

No. 18.

Iron Ore Business—Lake Freight Matters.

Everything pertaining to the ore business of the lakes for 1897 is still very slow of development. The most important announcement is a large sale of Mesabi ore to the Illinois Steel Co. by the Minnesota Iron Co., which was effected by Mr. Samuel Mather of the firm of Pickands, Mather & Co., who returned to Cleveland to-day (Thursday). All rumors of an amalgamation of interests between the Minnesota Iron Co. and the Illinois Steel Co. are authoritatively denied. Some stockholders of the manufacturing concern are still interested in the mining company, as they have been in the past, but no change of any kind has taken place on account of transactions regarding ore supplies. The Mesabi ore purchased from the Minnesota company will be sufficient, however, to meet all requirements of the Illinois Steel Co. this year. As to the rumor of the arrangement for Mesabi ore continuing through a period of years, there is neither confirmation nor a denial from officials of either companies.

Now that the Illinois company has provided for its supply of Mesabi ores, it is expected that their furnace representative will be in Cleveland early next week to arrange for old range ores. It is understood, also, that the Carnegie company will probably buy, next week, such supplies of old range ores as they will require. Purchases of old range ores by the Carnegie company are understood to have been delayed in part by the serious illness of Mr. Carnegie, who is now convalescing.

The contract made by J. H. Outhwaite & Co. to cover about 300,000 tons of ore, to be moved from Marquette to Ohio ports at 65 cents, will undoubtedly establish the Marquette contract rate at that figure. This ore is to come largely from the Pittsburg & Lake An-geline mine, and the shippers of it are enabled to make their arrangements somewhat in advance of competitors in the ore business, on account of close relations with consumers, and from the fact also that the high quality of the ore insures a ready market for it under all conditions. Ten vessels are involved in the contract, six of them belonging to the fleet of the late Capt. W. S. Mack. The other four are the Cherokee and Chippewa, owned by Curtis & Brainard of Toledo, and the Robert and David Wallace, owned in Lorain.

Bids have been sought, within the past few days, on another small block of Marquette ore, to be moved during the first four months of the season. This would be a desirable contract for vessels suited to the Marquette trade, as they would be at liberty to take advantage of the improvement that is expected later in the season, but a very low rate is sought by the shipper, who claims that he will be able to cover the ore at 55 cents or less.

It is now quite certain that this season will see a smaller difference than has existed in the past in the ore rates between the different shipping ports—Escanaba, Marquette and the head of the lakes. Some shippers are expecting that, in view of deep water from Lake Superior, the wild rate from Marquette will at times be practically equal to the rate from Escanaba. They figure on the distance from the two ports to Lake Erie ports being about the same, but it must be admitted, of course, that vessels trading to Marquette will encounter delays in the St. Mary's river. The two railways hauling ore from the mines to Marquette are making a strong effort to secure a big share of the tonnage, and it is expected that on the reduced rail rates they will again succeed in bringing about a marked increase in Marquette shipments this year.

Dealers in bituminous coal are actively engaged in preparations for the season's business, and some sales of importance have been made, but in the absence of ore contracts it can not be learned that any coal has been covered on season contracts further than two blocks for Portage, taken some time ago at 30 cents by A. A. Parker of Detroit and O. W. Blodgett of Bay City. Single-trip charters are at 20 cents to Lake Superior and 25 cents to Lake Michigan, but even cargoes for first trips at these rates are not plentiful.

Several hundred photograph negatives of lake ships are held in stock by the Marine Review. Prints can be made on short order.

To License Masters of Sailing Vessels.

Mr. Frye of Maine has again introduced in the United States senate a bill to regulate the licensing of officers of sailing vessels of more than 700 tons. It is really a measure to place the officers of sailing vessels in the same category with officers of steam vessels in the way of protecting shipping and the general public against the employment of incompetent men. According to this bill, no man can be employed as an officer of a sailing vessel over 700 tons until he has a certificate from the proper United States examining officials showing that he is fully qualified to perform the proper duties of his position. The bill further provides for the inspection of the hulls of sailing vessels by the national government in about the same way that is now obligatory upon steam vessels. When a similar bill was introduced in the last congress, the legislative committee of the Lake Carriers' Association deferred action regarding it, on the ground that sailing vessels were fast passing out of existence. They held, however, that the tow barges which are succeeding sailing vessels on the lakes are really in charge of licensed officers while being towed by big steamers, and that these barges, anyhow, are of a most substantial kind, and there is no cause for government interference in the management of them.

Opening of Navigation, 1897.

As a matter of record it may be well to note that the wooden steamer City of Berlin was the first of the Chicago grain fleet to leave for the lower lakes and was also the first vessel to pass the Straits of Mackinaw. She left Chicago at 8:30 in the morning of April 8 and passed the straits at 4 p. m. on the 9th. The second vessel through the straits was the light-house tender Dahlia, which arrived at Mackinaw City April 11. The City of Berlin went to Port Huron but other vessels of the Chicago fleet did not follow her very closely so that the first of the fleet to reach Buffalo was the steamer C. S. Parnell, which did not make that point until April 17. On April 20 the Sault river was opened by the tug River Queen passing up to the canal from Detour, but no large vessels were locked through the canal until the 22nd, when the steamer Rees passed through at noon, bound down. The Welland canal was opened April 20 and the Portage Lake canals April 24. The steamer E. M. Peck was the first vessel to reach Marquette—April 25—for a cargo of ore.

The name of A. Angstrom, of Toronto, formerly naval architect with the Cleveland Ship Building Co., appears in a supplement to the Inland Lloyds Insurance Register as builder of a small passenger steamer just completed at Toronto for Graham & Horne. The steamer is of steel with elm jacket. Her dimensions are 125 feet over all, 30 feet beam and 12 feet hold. She is intended for service in the Rainy River district of the British Columbia gold region, and will be taken to pieces and shipped to her destination by rail. It is said that she will have a river as large as the St. Lawrence to sail on. She cost \$40,000. Her name will be Keenora.

Capt. Arthur H. Hawgood of Cleveland, who has been appointed marine superintendent for the Flint & Pere Marquette Ry. Co., to succeed the late Capt. J. W. Martin, is a young man of good judgment and general experience in vessel business. Previous to becoming associated with his brother in Cleveland, in the management of the Hawgood & Avery fleet, he commanded some of the best vessels of that line, and in his experience ashore he has been in charge of steel as well as wooden craft. Capt. Hawgood will be located at Milwaukee.

Since its organization, the Insurance Company of North America has received in its marine department premiums amounting to \$58,574,439.30 and has paid losses aggregating \$49,543,840.25. The financial condition of the company on Dec. 31, 1896, was as follows: Assets, \$9,651,808.08; re-insurance, reserve, etc., \$4,332,034.56; capital stock, \$3,000,000.00; surplus as regards policy holders, \$5,319,773.52.

Modern Lake Tow Barges.

The principal ship building firms around the lakes are now finishing up some sixteen big steel freight carriers—steamers and tow barges—for which contracts were placed last fall, and a summary of this

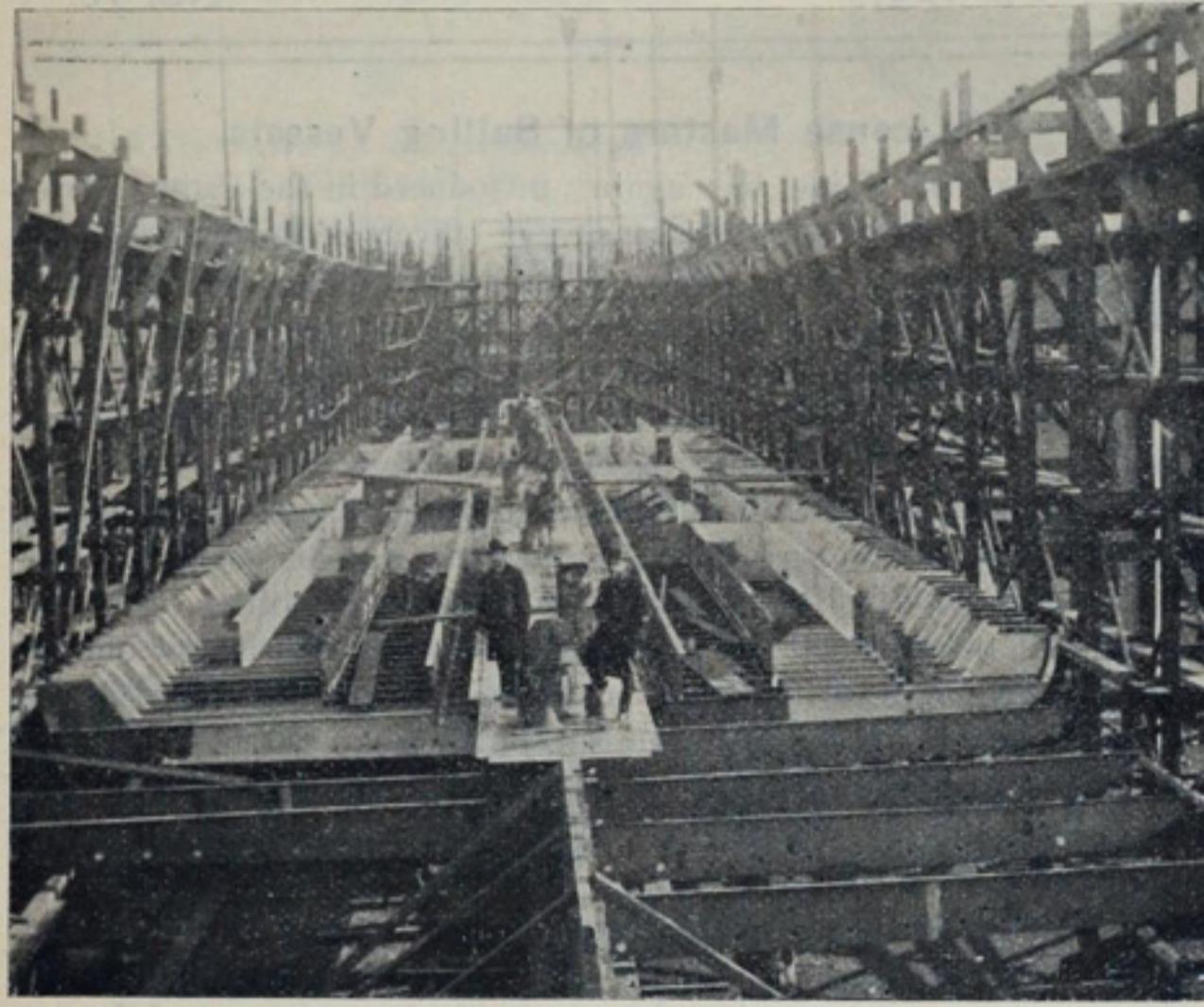


FIG. 1. TAKEN JAN. 14, 1897.

work in several instances shows a wonderful increase in the capacity of the leading yards. In last week's issue reference was made to rapid work at the Chicago yard, where five vessels were under way during the winter. The Globe Iron Works Co. of Cleveland also have five vessels in hand, but contracts for two of them, the new revenue cutters were received only a few weeks ago. Within the past four months, however, this company has worked up over 7,500,000 pounds of material in new vessels which they were building, taking care, also, of a very large amount of repairs to both hulls and machinery.

Two steel schooners at this yard, Sidney G. Thomas and Antrim, the former built for the Bessemer Steamship Co., and which was launched last month, and the latter for the American Transportation Co., to be launched within the next eight or ten days, will undoubt-

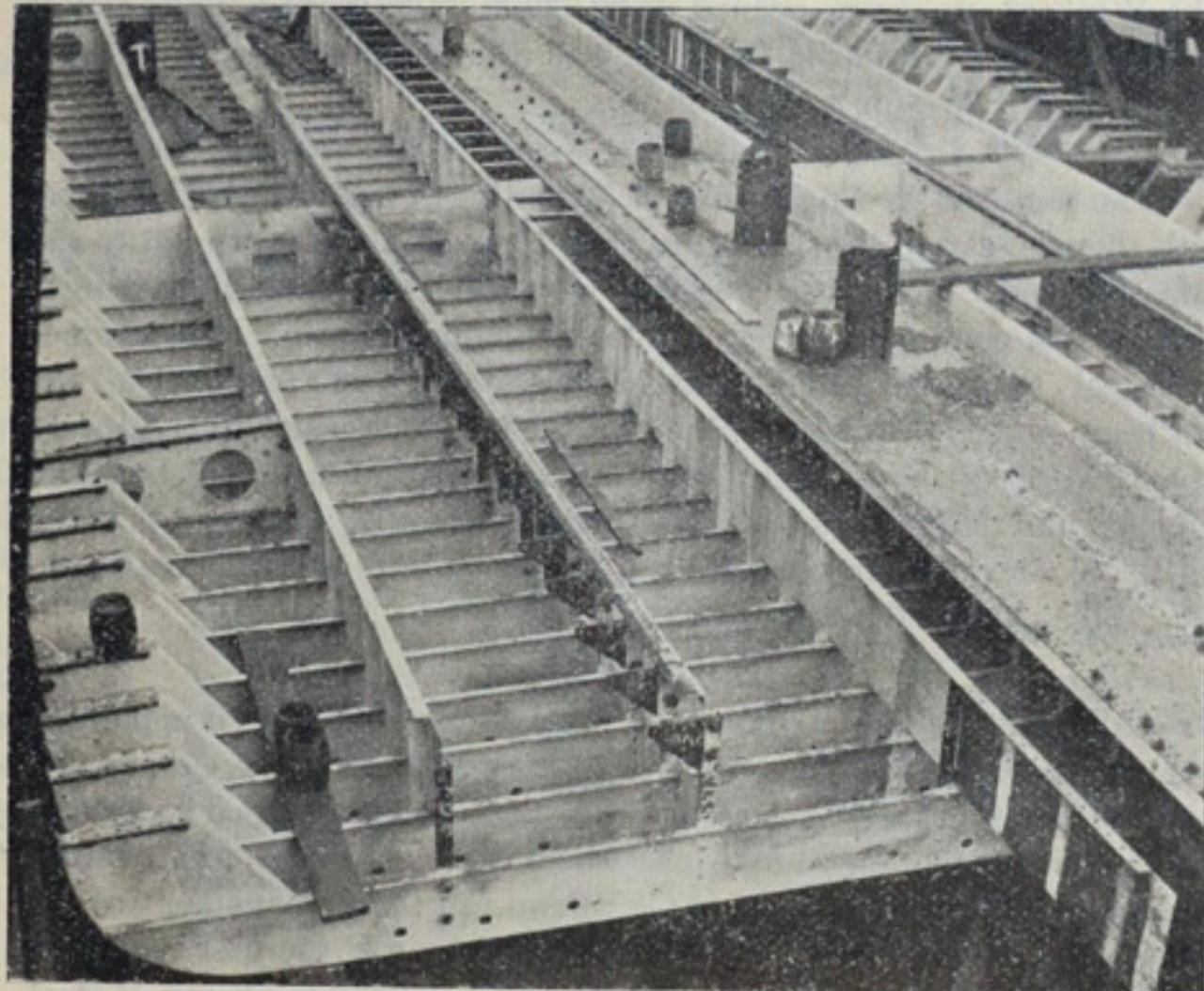


FIG. 2. TAKEN JAN. 14, 1897.

edly rank among the strongest vessels of their class on the lakes. The construction of these vessels differs considerably from other lake schooners, plate floors being used instead of the usual channel floors. Frames in the tank connecting the floor plates to the shell are constructed of angles of 4 by 3 inches by $8\frac{1}{2}$ pounds. The upper edges of the floors are flanged to take the longitudinal side girders, which are three in number on each side of the centre girder. These side

girders are also flanged, top and bottom, to take the floors and tank top, except the middle one, which has an angle connection to floors and also intercostal flange plates extending to the shell, forming a deep longitudinal girder directly connected to both tank top and shell plating. The side girders are further stiffened and connected to the floors by vertical angles of 4 by 3 inches by $8\frac{1}{2}$ pounds on every frame. The centre vertical keelson is 54 inches by 20 pounds per square foot, extending fore and aft, and connected to flat keel plates with double angles 4 by 4 inches by 9.7 pounds. This girder is double butt-strap-

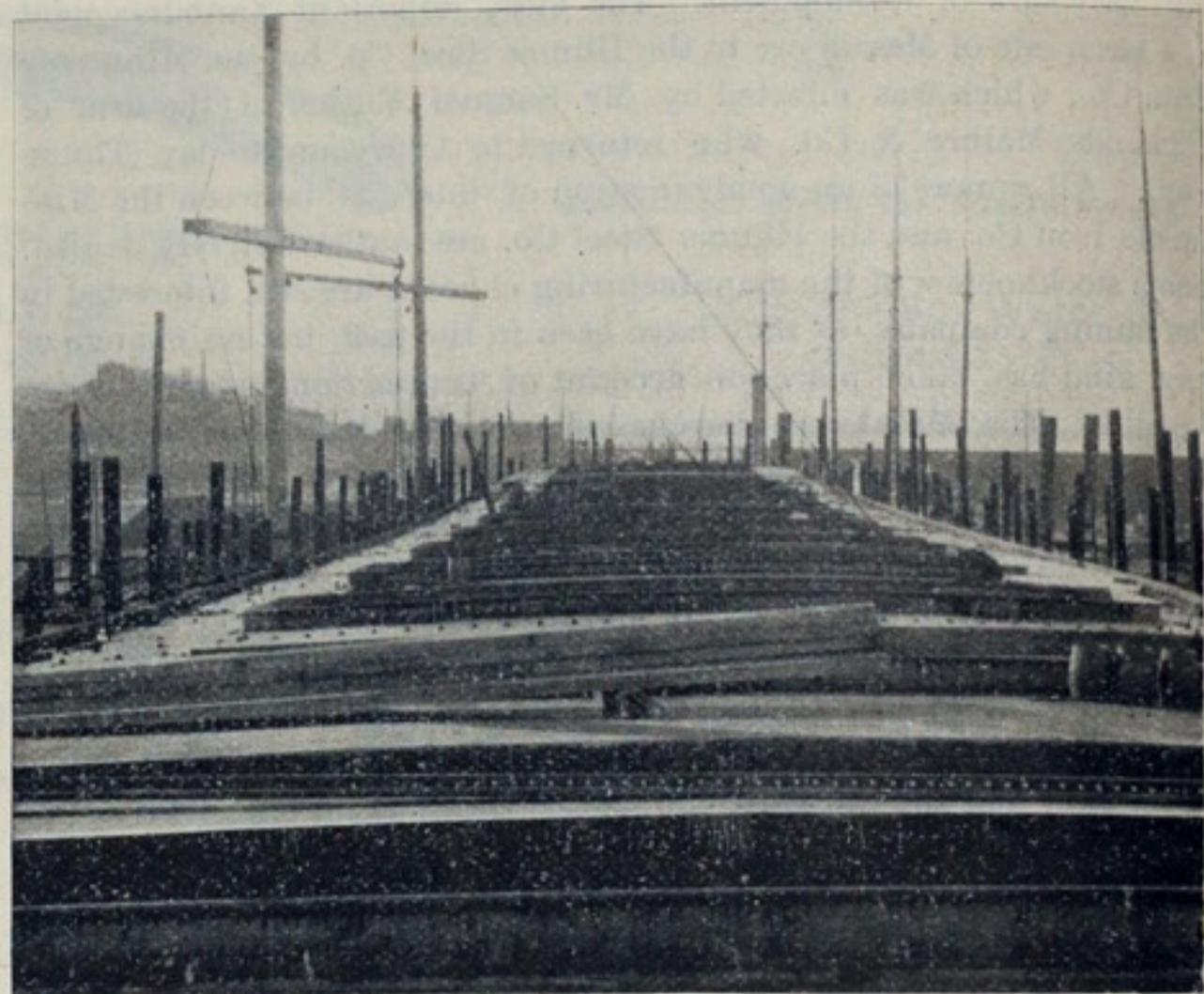
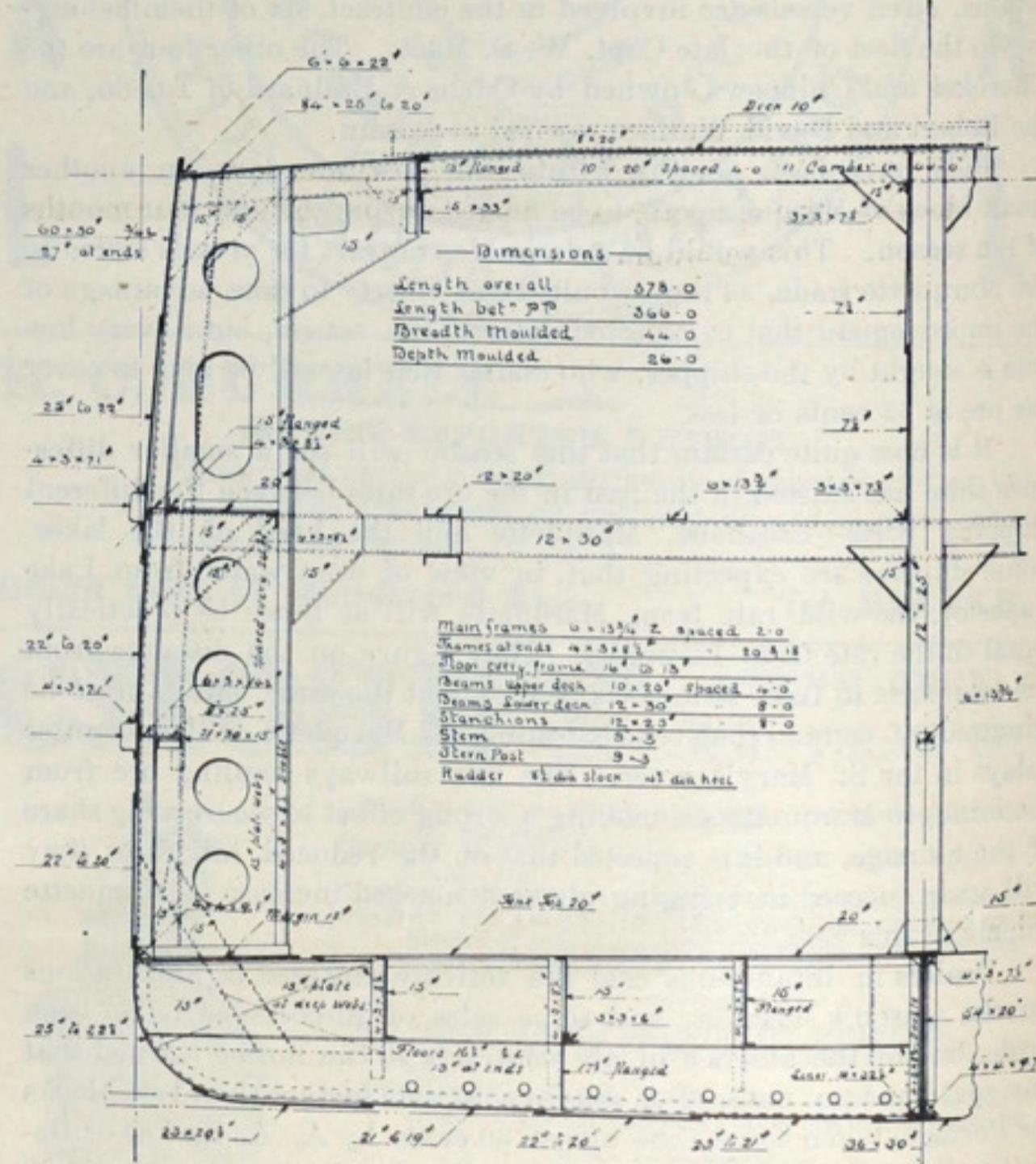


FIG. 3. TAKEN FEB. 14, 1897.

ped and treble riveted throughout. The tank top is 20 pounds per square foot, except the margin strake, which is 18 pounds, and is stiffened on the under side every two feet with angles of 3 by 3 inches by $7\frac{1}{2}$ pounds, instead of the usual channel side frame. This design of floor is probably more expensive than the floor plate on the channel system, but the Globe company considers it a better structure, as



CROSS SECTION OF MODERN LAKE TOW BARGES.

the continuity of the floor is not broken to the centre keelson until it attaches directly to the bilge strake, or well up on the turn of the bilge. Frames of Z section, 6 inches by $13\frac{1}{2}$ pounds, have been substi-

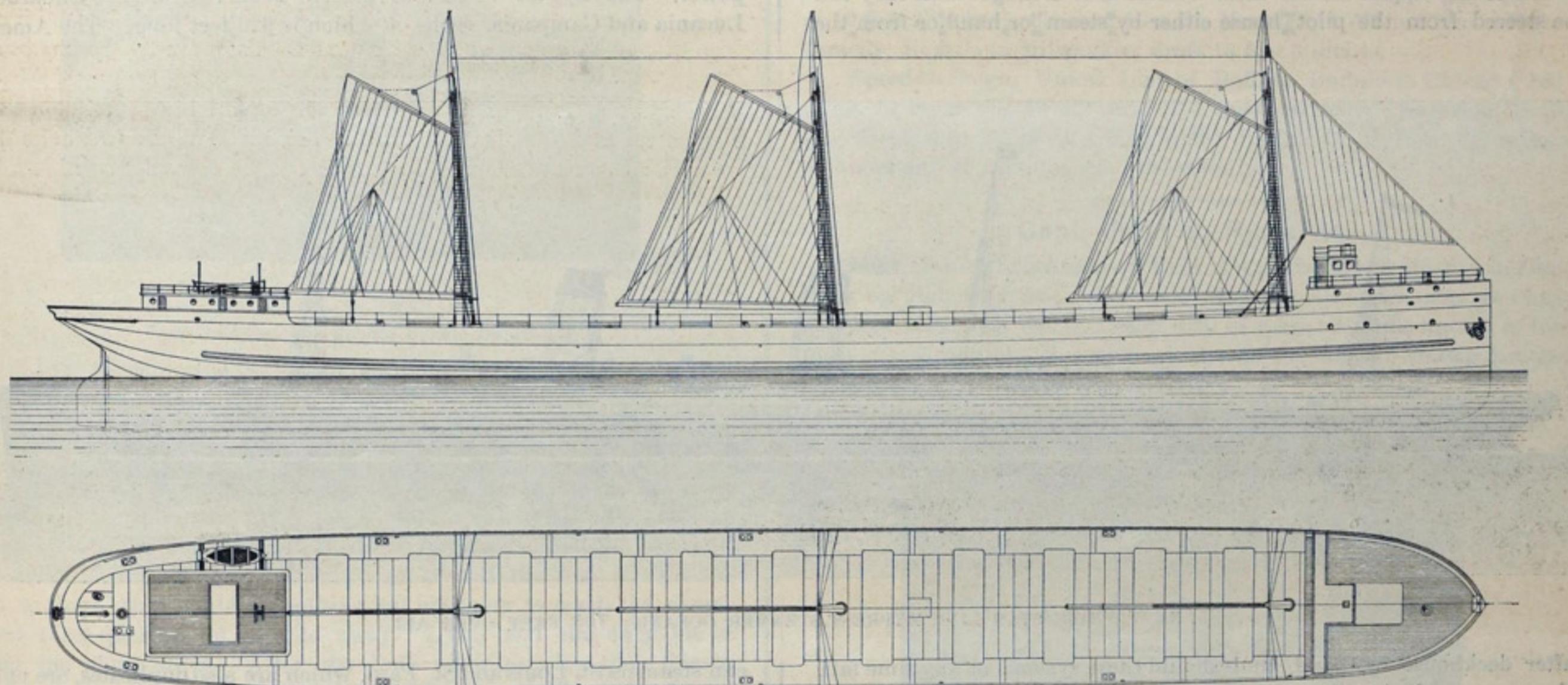
tuted, the Z frame being also regarded by this company as superior to the channel frame for rivet connections to the shell plating.

A notable feature in the construction of this vessel is the use of large plate web frames in every 24 feet of her length. These web frames are 4 feet 3 inches wide and 15 pounds per square foot, with double face bars of 4 by 3 inches by $8\frac{1}{2}$ pounds, and strongly connected to the tank top and upper deck beam. "If we regard a vessel as a beam," says the officer of the Globe company who designed these ships, "it must be said that the neutral axis is very low in barges that have been built on the lakes, owing to the very heavy construction of the double bottom, or lower member, which causes a tension of about $5\frac{1}{2}$ tons per square inch on the upper member. Having in view this inherent defect or weakness in lake vessels of the past, I have tried to overcome it and have succeeded in raising the neutral axis about 9 or 10 inches and reducing the tension to about $4\frac{1}{2}$ tons. This was accomplished by lightening up the double bottom. Angle irons were taken out wherever it was possible to do so and the weight thereby saved put into the large web frames and into the spar deck stringer and shear strake. The function of these web frames lies not only in stiffening the boat in the transverse direction, but they form a very efficient tie between the top and bottom member, and they will avoid in these present ships, to a certain extent, we believe, the panting that has been so noticeable of late in some of the large lake vessels."

The usual channel web frames of 15 inches by 33 pounds are

along this line to a much greater extent than is shown in the present vessels, provided that owners can be brought to understand the advisability of taking a little weight from other parts of the ship where it is at present absolutely wasted. It is, in fact, worse than wasted, inasmuch as it is carried around day after day; and since it is of very little service, this weight could, with advantage, if we must retain our present conditions, be done away with altogether and a proportionate amount of cargo carried."

The keel plate is 36 inches by 30 pounds per square foot; bottom plating 23 inches to 21 pounds; bilge, 25 pounds; side plating, 22 pounds, and the shear strake 60 inches by 30 pounds for three quarters of the length of the vessel amidships, reduced to 27 pounds at ends. Stanchions, spaced every 8 feet, are of channel section, 12 inches by 15 pounds, and in one piece from tank to upper deck, to which they are securely bracketed. On the lower deck beams, and spaced about 13 feet each side of the centre line, are double continuous channels of 12 inches by 20 pounds, and also 6 inches by 13-pound tie between hatches only. Between the upper and lower decks and riveted to the stanchions and beams is a cargo shifting bulkhead, or screen bulkhead, extending the whole length of the cargo hold. This bulkhead is not continuous but is broken at the hatches where it fits in portable battens. The upper deck plating is 10 pounds per square foot and worked athwartship, the laps coming on the flanges of the beams.



SIDE ELEVATION AND DECK PLANS OF LAKE TOW BARGES.

spaced every 8 feet, as are also the lower deck beams, which are 12 inches by 30 pounds, both being efficiently connected by large flange bracket plates. The main deck stringer plates weigh 20 pounds per square foot and are connected to the shell plating with flange plate of 15 pounds per square foot. The upper deck beams are channels of 10 inches by 20 pounds, spaced every 4 feet, on which is worked the upper deck stringer plate, 84 inches wide by 25 pounds per square foot, and further stiffened by a continuous vertical channel of 15 inches by 33 pounds on the under side of the beams and connected to the stringer by intercostal flange plates. This, in itself, makes an excellent stiffener to the spar deck. Large bracket plates, strongly secured to this channel tie and the plate webs, take the place of quarter stanchions, which are so objectionable in handling freight, but which, in the construction of vessels above a certain beam, are essential and called for in all classification rules. The upper deck stringer plate is connected to shear strake by angle of 6 by 6 inches by 22 pounds.

"It may also be noted," says the officer of the Globe company who furnishes a description of these vessels, "that our endeavor to obtain in the girder a top member more in conformity with the girder in daily use, has placed such a distribution of metal in the neighborhood of the spar deck that this type of vessel is equivalent to the requirements of some European classification societies for sea-going vessels of 15-foot hatch. This will indicate the improvement over the old distribution of material. It is the intention to carry out ideas

Deck houses are of steel, neatly paneled and pilastered, and large side lights with composition frames have replaced the ordinary windows. The after house is 38 feet long and 22 feet wide and has accommodations for captain, mate, engineer and steward. There is a large dining room 9 feet wide by 22 feet long and also galley, pantry, ice box and all necessary lockers. The dining room and captain's quarters are neatly finished with hard wood in a system of neat panels, all of which can be easily removed. A bath room and other accommodations are connected with the captain's apartments, and the dining room has a large skylight running nearly its whole length, giving it a light and airy appearance.

Boilers and all machinery are located foward, and the foremast, which is of steel, alike to the other spars, is used as a smokestack. The pilot house is on the forecastle deck and just aft of the towing machine house. In the boiler room is placed the ballast pump, feed pump and electric plant. On the upper deck is a Globe steam steering engine and Globe steam capstan windlass, as well as a steam towing machine made by the American Ship Windlass Co. There are three anchors of the Baldt type, two of them bowers of 3,500 pounds each, and a Kedge anchor aft of 1,200 pounds.

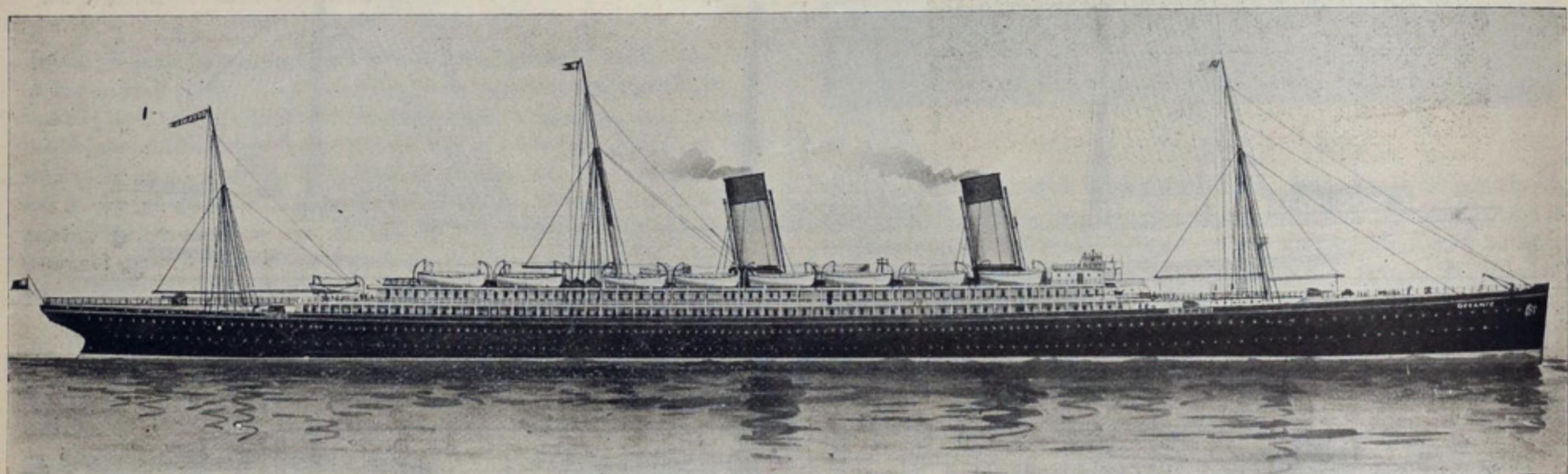
The principal dimensions of the Sidney G. Thomas and the Antrim are: Length over all, 378 feet; length between perpendiculars, 366 feet; beam molded, 44 feet; depth moulded, 26 feet; depth of tank, 4 feet 6 inches. These vessels are supplied with three masts and

carry four sails, and present a very neat appearance. One other feature of the equipment, the pumping system, is also worthy of description. On the boiler deck, forward, is placed a large ballast pump connected to the several water bottoms by one pipe of 14 inches diameter, reducing to 9 inches at the after end, and forming what may be designated the main drain. Branching off from this pipe in the several compartments is a system of 7-inch valves, i. e. one 7-inch valve to each tank, making a total of twelve valves. Stems of these valves are led from the tank top to the spar deck and there terminate in a neatly finished brass deck plate. The builders have endeavored to arrange this system so that when the engineer has once started the pump the entire pumping apparatus will be under the control of the officer on the deck. Should he wish to pump out any particular tank, all he has to do is to open up his deck plate, turn the spindle and open the valve of that particular compartment. When emptied he can close down the same, and the process of filling is equally simple. The deck officer can also instruct any of the deck hands to open either one or two of the sea valves, these boats having two 11-inch valves, one forward and one aft, and he is thereby in complete control of the filling apparatus. Should he wish to flood the compartments, he can remove the cap from the deck plate and open one or two valves leading to any particular compartment. It is expected that this arrangement will overcome friction that often exists between the deck and engineering staffs.

Steering apparatus on these vessels is so arranged that they can be steered from the pilot house either by steam or hand or from the

BIGGEST SHIP EVER DREAMED OF.

An illustration of the new White Star line steamer Oceanic, which was prepared from plans of the builders, and which is the first picture of the ship to appear in this country, is printed herewith. In only one respect, that of beam, or width, is this mammoth Atlantic express steamer to be inferior to the Great Eastern. Her length, 705 feet, will be 25 feet in excess of the length of the Great Eastern. Her depth will be a trifle more than 50 feet, affording a mean draft of 25 feet. This steamer is now under construction in the ship yard of Harland & Wolff, Belfast, Ireland. She is to be launched next January, and it is expected that a year from this time she will be in service between New York and Liverpool. Unlike the owners of the Great Eastern, the management of the White Star line are attempting no startling innovations in the construction of this ship. She will be merely an enlarged counterpart of the Teutonic and Majestic, built along well established lines of practical development in big steamers of this kind. And yet her dimensions represent a great increase over the largest of the Atlantic liners now in commission or under construction. The Kaiser Wilhelm der Grosse, now being built in Germany for the North German Lloyd Co., and which was illustrated and described in the Review of March 25, will be 56 feet shorter than the Oceanic. The German steamer is to be 625 feet between perpendiculars, 649 feet over all, 66 feet beam and 43 feet molded depth, and will have four-cylinder triple expansion engines (two) of 28,000 horse power. The largest vessels at present in service are the Cunarders Lucania and Campania, each of which is 620 feet long. The Ameri-



NEW WHITE STAR LINE EXPRESS STEAMER OCEANIC, 705 FEET OVER ALL.

after deckhouse by hand, and should these systems at any time fail, they are supplied with a spare tiller of ample size and strength to enable them to steer with the aft capstan when the vessel is moving at full speed. It may be noted also that these vessels are fitted with three Globe capstans—one forward, one between the second and third hatches and one aft of the deck house. A deck hoist, manufactured by the Chase Machine Co., Cleveland, is another feature of their equipment.

A few illustrations printed herewith, and which were made from the photographs taken while these vessels were under construction, will tend to indicate the capacity of some of the lake yards. They also show structural features of the vessels. Photographs 1 and 2 represent one of these vessels on Jan. 14, within about two weeks after the laying down of her keel. Fig. 3 represents the same vessel on Feb. 14, or just one month later, when she was practically plated and had nearly all of her spar deck plating on also. This progress was made at a time when two other new vessels were building, and when repair work was unusually active.

The large single-sheet chart of Georgian bay, just issued by the British admiralty, was prepared from the surveys on which Staff Commander J. G. Boulton, R. N., has been engaged for several years past. This chart may be had from the Marine Review for \$1.75. The price is higher than is usually charged for navigators' charts, but this one takes the place of probably ten sectional charts and is corrected up to date.

Appointments of captains and engineers for 1897, vest pocket size, \$1.00. Order from the Marine Review, Cleveland, Ohio.

can steamers St. Louis and St. Paul, which are also duplicates, are only 554 feet long, and the lake passenger steamers North West and North Land are little more than half as long as the Oceanic. With her crew and passengers the Oceanic will carry more people than make up the population of the average American village. The people on board of her will outnumber the residents of many well-known towns. All the members of the house of representatives and the senate, as well as the president and his cabinet, the judges of the supreme court of the United States and the heads of the departments in Washington, could find accommodation in her cabin, and there would still be room enough for the entire legislature of any of the largest states.

The intention in the construction of this enormous craft is not to make her a record breaker in point of speed. Yet she will be an exceedingly fast ship, as she is intended for the first-class passenger service. She is expected to land her passengers regularly every Wednesday morning in New York and Liverpool, making the trip across the Atlantic in less than a week. She is to make Queenstown by daylight, enabling her passengers to travel to places beyond the port of arrival and reach their homes in comfort during the day. In order to perform even this service, it will be necessary to make the power of the Oceanic far greater than that of any ship afloat. She will have three sets of triple expansion engines of 15,000 horse power each, or a total of 45,000 horse power, against about 20,000 in the Campania and Lucania and 28,000 in the Kaiser Wilhelm der Grosse.

Inquire of agents of the Nickel Plate road for low excursion rates to St. Louis, May 4 and 5. Rates lower than via other lines. 37 May 2

Life-Saver Daniel E. Lynn.

Everybody on the lakes knows of the Lynns of Port Huron, who have been in the tug and vessel reporting business for a great many years. Daniel E. Lynn, one of the young men of this family, is about to receive a gold medal from the government, in recognition of a num-



DANIEL E. LYNN.

From the Illustrated Sunday Buffalo Express.

ber of lives saved on the St. Clair river, but more especially for a particularly gallant but unsuccessful attempt to rescue the crew of the schooner Wm. Shupe, which went ashore above Fort Gratiot light during a severe storm in May, 1894. Mr. Lynn led a party of volunteer life savers who tried to take the crew from the rigging of this vessel. The volunteer crew pulled to the wrecked vessel, and was about to take the men off when three large seas filled the boat and she rolled over. They all tried to get back to the boat, but the sea was so high they could do nothing but endeavor to reach the shore, about three-quarters of a mile away. Lynn was the only one to reach the shore alive. After the four volunteers lost their lives a special train went after the government life-savers at Sand Beach and they arrived late in the afternoon and took the crew off. Lynn's heroism appealed to the people of Port Huron and they requested recognition of his gallantry by the government. It was found that, under the attorney general's interpretation of existing law, no life-saving medal could be awarded for volunteer service of this kind, and a special act of congress was necessary. Senator James McMillan of Michigan took the matter up, and a bill was put through congress bestowing a first-class gold life-saving medal upon the Port Huron man. The bill had the approval of Secretary Carlisle and of Superintendent Kimball of the life-saving service, and one of President Cleveland's last acts in office was to sign, on March 2, this measure. The medal is being made at the Philadelphia mint.

David Bell of Buffalo has begun the construction of a steel tug for the Cleveland Tug Co. (L. P. & J. A. Smith), that will be the most powerful vessel of its kind on the lakes. Dimensions are 90 feet over all, 23 feet beam and 14 feet depth. Engines are to be fore-and-aft compound, with cylinders 20 and 40 inches diameter and 30 inches stroke. A boiler 16 feet long and 12 feet diameter will furnish steam at 150 pounds pressure and the shaft will be 8½ inches with a 9-foot wheel. The tug will be fitted with steam steering gear and other modern appliances. She will be finished in August.

Now that the Lake Ontario grain movement will be increasing, masters will want Lake Ontario general chart No. 61 and coast chart No. 1, as well as St. Lawrence river charts Nos. 4, 5 and 13. The five will be sent by the Review to any address by express for \$2.

Speed and Cargo Records—Lake Freight Steamers.

On a draft of 15 feet 8 inches forward and 16 feet 3 inches aft, the new steel steamer Andrew Carnegie, owned by the Wilson Transit Co. of Cleveland, is now on the way from Duluth to Buffalo with a cargo of 182,000 bushels of wheat. This is the largest wheat cargo ever moved from Lake Superior. It foots up in weight 5,460 net tons. A mixed cargo of barley and wheat, moved last season by the steamer Queen City, weighed 5,490 net tons.

Iron Ore—Coralia, Mutual Transportation Co. of Cleveland, 5,088 gross or 5,699 net tons, Gladstone to Ashtbuala, draft of 16 feet 10 inches. From Lake Superior—Steamer Sir Henry Bessemer, Bessemer Steamship Co. of Cleveland, 4,637 gross or 5,194 net tons, Ashland to Conneaut, draft of 15 feet 9 inches.

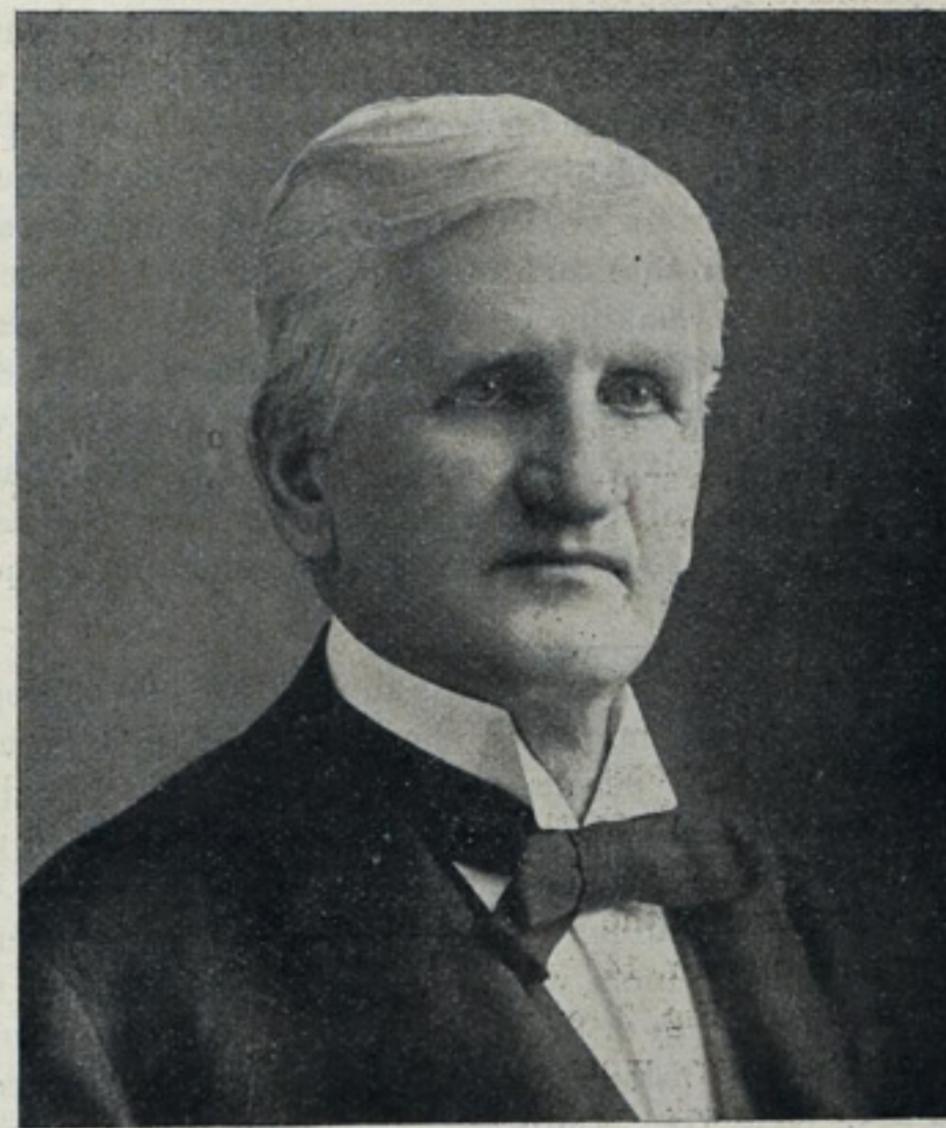
Grain—Steamer Queen City, A. B. Wolvin of Duluth, 207,000 bushels of corn, equal to 6,210 net tons, Chicago to Buffalo, 16 feet 8 inches draft; steamer Zenith City, A. B. Wolvin of Duluth, 289,000 bushels of oats, Chicago to Buffalo. From Lake Superior—Steamer Queen City, A. B. Wolvin of Duluth, 156,256 bushels of barley and 58,000 bushels of wheat, equal to 5,490 net tons, Duluth to Buffalo; steamer Andrew Carnegie, Wilson Transit Co. of Cleveland, 182,000 bushels of wheat, equal to 5,460 net tons, Duluth to Buffalo on draft of 16 feet, even.

Coal—Steamer Andrew Carnegie, Wilson Transit Co. of Cleveland, 4,997 net tons of bituminous coal, Cleveland to Sheboygan, draft of 15 feet 2 inches; schooner Geo. N. Hartnell, 4,777 net tons of anthracite, Buffalo to Milwaukee, draft 15 feet 5 inches.

Speed—Owego, Union Line of Buffalo, Buffalo to Chicago, 889 miles, 54 hours and 16 minutes, 16.4 miles an hour; Centurion, Hopkins Steamship Co. of St. Clair, Mich. Buffalo to Duluth, 997 miles, 65 hours and 10 minutes, 15.3 miles an hour.

Capt. John S. Richards.

Capt. John S. Richards of Erie, Pa., who died suddenly in Chicago on Saturday last, was well known to all vessel men who had dealings with the W. L. Scott Co. of Erie. He was known to the older vessel men as a pioneer navigator on the lakes. Among famous



CAPT. JOHN S. RICHARDS.

passenger steamers which he commanded in early days were the side-wheeler Pennsylvania and later the Keystone State. Upon retiring from the lakes, Capt. Richards was given an important position with the late W. L. Scott, and was associated with the Scott interests at Erie up to the time of his death.

A contract for another ferry boat, to be used in the Pennsylvania Co.'s service between New York and Jersey City, has been awarded to the Charles Hillman Ship & Engine Building Co. of Philadelphia.

The Review has excellent photographs of lake ships.



DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio,
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binders sent, post paid, \$1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second class Mail Matter.

The books of the United States treasury department on June 30, 1896, contained the names of 3,333 vessels, of 1,324,067.58 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1896, was 383 and their aggregate gross tonnage 711,034.28; the number of vessels of this class owned in all other parts of the country on the same date was 315 and their tonnage 685,204.55, so that more than half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1896, was as follows:

	Number.	Gross
		Tonnage.
Steam vessels.....	1,792	924,630.51
Sailing vessels and barges.....	1,125	354,327.60
Canal boats.....	416	45,109.47
 Total.....	3,333	1,324,067.58

The gross registered tonnage of the vessels built on the lakes during the past six years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1891.....	204	111,856.45
" " " 1892.....	169	45,968.98
" " " 1893.....	175	99,271.24
" " " 1894.....	106	41,984.61
" " " 1895.....	93	36,352.70
" " " 1896.....	117	108,782.38
 Total.....	864	444,216.36

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			Suez Canal.		
	1895*	1894	1893	1895	1894	1893
No. vessel passages.....	17,956	14,491	11,008	3,434	3,352	3,341
Tonnage, net registered.....	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of navigation.....	231	234	219	365	365	365

* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about $\frac{1}{2}$ per cent. of the whole, but largely in American vessels.

Why are ships assumed to be divided into sixty-fourths? The custom of making such a division has prevailed in Great Britain for a great many years past, and it was so in numerous cases on the lakes until stock companies became popular. A writer in the Liverpool Journal of Commerce gives the following as the origin of the custom: When vessels were of small dimensions it was the custom to take the plans of the designer for working practice, and the builder divided the hull by a midship fore and aft line, which was again bisected. The four quarters were again quartered, and these sections again divided by four, so that each of the first four quarters contained sixteen divisions, thus making a total of sixty-four. The draughtsman prepared the sixty-four parts for the moulders, and this was a handy method for sub-contracting. In process of time a ship was described as consisting of sixty-four parts, and owners purchased the entire vessel. In deeds of purchase ships were described as sixty-fourths, and this cube of four quarters became generally accepted for the division of shares.

Allotments have been made of the fund of \$50,000 appropriated by congress for the naval militia of the states. Of the total amount \$2,000 is reserved for the purchase of text books. The remainder is allotted among the states having naval militia organizations in proportion to the number of uniformed petty officers and men they had on their rolls on the first of January. The largest number of men is reported from the state of Illinois, which gets the largest share of the appropriation—over an eighth of the whole. Next in order comes Massachusetts, and at some distance behind that commonwealth come in order the states of New York, California and New Jersey. Then follow the states of Maryland, Louisiana, Georgia, Pennsylvania, Michigan, Ohio, South Carolina, Rhode Island, North Carolina and Connecticut. The showing made by Illinois is due to early organization in Chicago, and to advantages gained by the naval militia at that point following the close of the World's Columbian Exposition.

Col. Lydecker of the United States engineer corps, who is in charge of the big government works at the Sault, declared very positively, in a communication to the Review some time ago, that it was not at all probable that there would be any difficulty with machinery of the new Poe lock on the opening of navigation this spring, but dispatches from the Sault again report trouble with the gate machinery, and go so far as to say that some people acquainted with the difficult

ties that have been encountered are of the opinion that extensive alterations must be made before the lock will work properly. In connection with all of these reports it may be well, however, to take into account the fact that the people of the Sault are exceedingly jealous of their Canadian neighbors, and may be over-anxious about the loss their merchants would sustain by our vessels occasionally using the Canadian canal.

It would seem that Atlantic coast ship builders are capable of producing repair bills that are even more startling than those of their brethren in other parts of the country. The Cramps have just handed the secretary of the navy a bill for \$138,000 for repairing the cruiser Brooklyn. The Brooklyn had hardly been accepted by the government when she grounded in the Delaware river, suffering extensive bottom damages. Some of the naval officers claim that their estimates of the cost of repairs were not above \$8,000 to \$10,000. Department chiefs are said to have not as yet recovered sufficiently from their astonishment, upon receipt of the bill referred to above, to give the matter consideration.

A bill recently introduced in the United States senate by Mr. Smith authorizes the secretary of the navy to contract with the Pneumatic Gun Carriage & Power Co. for a floating battery, to be designed by Lewis Nixon of Elizabeth, N. J., and to cost \$700,000. The vessel is to be 180 feet long, 40 feet wide and 13 feet deep; to draw 11 feet of water, to displace 1,500 tons and have a 5-inch belt of armor all around, which is to be 2 feet above and 3 feet below the water line. She is to have steam power for 12 knots, and to have two armor-piercing guns on pneumatic carriages.

A late announcement from Newport News is to the effect that the big ship yard at that point will soon begin work on a large express steamer for which the directors of the Pacific Mail Steamship Co. made an appropriation at their last meeting. Mr. C. P. Huntington is a leading stockholder in both the steamship company and the ship yard. It is said that the steamer will be similar in dimensions to the White Star liner Teutonic and will cost about \$1,350,000.

The number of miles run per ton of coal (2,000 pounds) by freight locomotives on the Lake Shore & Michigan Southern Ry. during 1896 was about nineteen. Modern lake freight steamers, carrying 5,000 tons of freight, which would be equal to the contents of several of the largest trains ever hauled by a locomotive, are moved about 10 miles, at a speed of $12\frac{1}{2}$ miles an hour, on one ton of coal.

Elaborate experiments by Germany to ascertain the best colors for warships have led to the conviction that olive green, which is favored by the United States navy in time of war, is the best, because it renders ships least visible to an enemy. It is true that dark brown has great advantages by day, but there is no doubt that olive green is the hardest to make out at night.

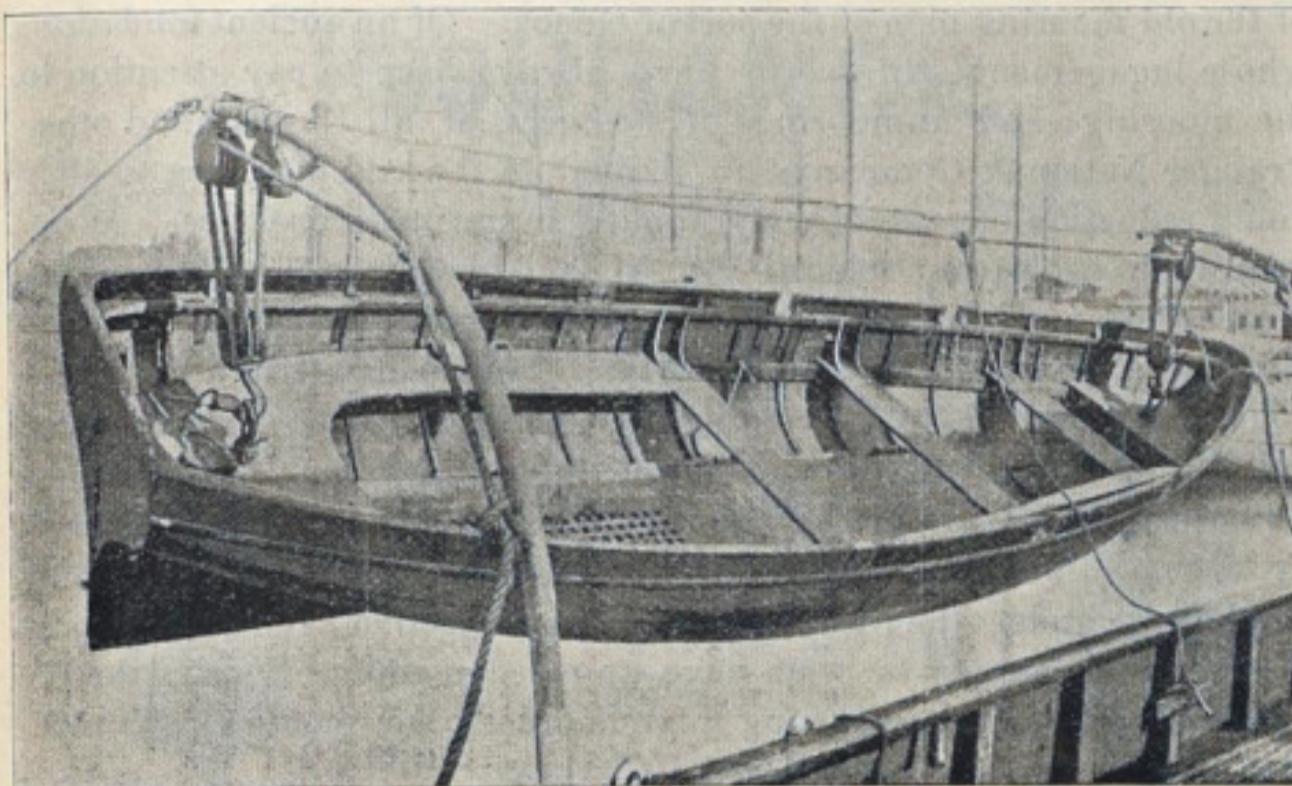
Experiments with Nickel Steel.

Experiments with nickel steel made recently by the British admiralty have brought out some interesting points in favor of that material. For twelve months plates of nickel steel, ordinary mild steel, and wrought iron were immersed in the sea, and the loss of weight in that time due to corrosion worked out at 1.36, 1.72 and 1.89 per cent. respectively. A number of bars of nickel steel and carbon steel, $1\frac{1}{2}$ inches square and 18 inches long, were some time ago placed on supports 10 inches apart, and a weight of 1,000 pounds allowed to fall on them from a height of 3 feet, the bars being reversed after each blow. The carbon steel was fractured after five blows and broken after twelve blows, whilst it required seven blows to fracture the nickel steel and thirty-five blows to break it—an increase of 147 per cent. It is the general opinion of engineers acquainted with the qualities of this material that if it should be adopted for cylindrical boilers that have very thick shells, such as are used in large steam vessels, a saving of 25 per cent. could be effected in weight.

The North American Gymnastic Union and National Festival Bundes-turnfest is to be held in St. Louis. Excursion tickets are on sale May 4 and 5 via Nickel Plate road at rates lower than via other lines.

Necessary to Safe Navigation.

The medal awarded by congress to Daniel Lynn of Port Huron will attract attention to opportunities for saving life on the lakes. In order to lower a life boat or yawl from a vessel to go to another in distress, or to get a boat clear from a sinking or burning vessel when a sea is on, something more than the ordinary attachments to the davits are required. After a boat has rescued a crew from another vessel, or from danger of any kind to which they may be subjected, it is even more important that the device be arranged so that it can be readily hooked on in a sea-way, as the number of lives at stake is



greater than was the case when the boat was cast off. Common, humane sense demands that men, whose employment requires them to meet daily the perils of navigation, should at all times be provided with the best life-saving appliances that are to be had. The only device, so far as known, that meets the requirements attending the proper management of life boats is the Standard automatic releasing hook, illustrated herewith. Several lake steamers are equipped with this hook, among them the State of Ohio of the Cleveland & Buffalo line and the new revenue cutter Gresham. It is, in fact, used on all the new revenue cutters. Capt. J. W. Congdon of the cutter Dexter, says that it is the best device he has ever seen—simple and reliable. Capt. Alex. J. McKay of the City of Detroit, after seeing its practical working features, says that it fulfills all the requirements in releasing and hooking on, and Capt. John Edwards of the City of Buffalo recommends it for quick work. Capt. George E. Merritt of the Parks Foster tried the hook on his boat and says that it fulfills all expectations. These hooks are in use on all steamers of the Old Dominion line, on Vanderbilt's yacht Conqueror, and in fact they have been quite generally adopted on the coast. In several accidents that occur-



red on the lakes last season the use of this device would have been of great advantage, and even if no lives are lost, the smashing of a yawl against the side of a vessel costs more than an entire equipment of these hooks. Since the schooner Bird of Rockland, Me., has been equipped, her crew has saved four ship-wrecked crews. Often in cases of collision with other vessels or contact with rocks a vessel is saved from sinking by a stuffing material of some kind being placed near enough to the hole to cause the suction to draw it into the fracture. This must be done at once in order to be successful, and there are

numerous other cases where life and property are dependent upon rapid work in getting a small boat over the side of a vessel. A boat equipped with Standard hooks was released from the steamer Macales-
tor when she was running 14 miles an hour. It was done so quickly that the crew had a boat alongside a capsized sail vessel before the captain of the steamer, who was below, had time to get up on deck. A boat equipped with these hooks was lowered in less than two minutes from the Sound steamer New Hampshire, to rescue a passenger who had fallen overboard. Capt. J. R. Raymond, the inventor of this hook and manager of the company, which is located at 22 and 24 State street, New York, is making a trip around the lakes. He has a handsome working model, in which marine men generally will be interested.

Compound Steam Turbines for Marine Propulsion.

In view of the success that has attended the application of turbine engines to one of the British torpedo boat chasers, the subject of machinery of this kind in connection with marine propulsion was regarded as of special importance at the recent meeting of the Society of Naval Architects in London. It was stated at the meeting that the manufacture of the compound steam turbine was first commenced in 1885 with the construction of small engines for the driving of dynamos. Two years ago, a syndicate was formed to test thoroughly the application of the compound steam turbine to marine propulsion and a boat was designed for this purpose. A serious difficulty, however, arose in the cavitation of the water, or the hollowing out of the vacuous spaces by the blade of the screw, the whole energy of the screw when at a high speed being expended in maintaining this space. The single compound turbine engine was then removed from the boat and replaced by three separate compound turbines directly coupled to three screw shafts, working in series on the steam, the turbines being the high pressure, intermediate and low pressure, and designed for a complete expansion of the steam of 100-fold, each turbine exerting approximately one-third of the whole power developed, the three new screw shafts being of reduced scantling. The advantages claimed for this engine are increased speed, increased carrying power of vessel, increased safety, reduced weight, space, initial cost, and cost of attendance, etc. The author of a paper on this type of engine said, in answer to a number of questions, that it was perhaps a little premature to say how far one could go in the direction of reducing the speed of the engines for vessels larger than the torpedo boat chasers, but it would be very much reduced. By increasing the beam, provided the horse power was considerable, the speed revolution would be diminished in direct proportion as the diameter of the turbine was increased. Roughly speaking, the turbine was most applicable to boats of 15 knots and upwards. That was without the use of gearing; if gearing were used it would be applicable to all classes of ships. The diameter of the propellers was 18 inches and cavitation began when the mean pressure on the blades exceeded 11½ pounds.

Atlantic was Sunk off Long Point.

Editor Marine Review:—Your correspondent from Hearne, Texas, Mr. T. E. Kinney, who writes very interestingly in the Review of the 15th inst. about the loss of the steamer Atlantic, and the great work of Wm. Harrington, the diver who recovered a safe from the vessel, must be mistaken as regards the location of the sunken vessel in Lake Erie. Everybody on the lakes knows that the Atlantic was sunk off Long point, and it is probably unfortunate, therefore, that the gentleman from Texas should locate her off Point au Pelee, as the error may tend to discredit his story, which is very interesting and probably correct otherwise. There is no deep water in the vicinity of Point au Pelee.

Dunkirk, N. Y., April 28, 1897.

Old Mariner.

A vest pocket pamphlet just issued by the Marine Review contains appointments of captains and engineers for 172 fleets of vessels owned on the lakes. It is practically a complete list of vessels, owners, captains and engineers on the lakes, corrected to date and put in the most concise form that it is possible to arrange the several thousand names contained in such a collection. It is neatly bound and durable. Mailed to any address on receipt of \$1.

One fare for the round trip to St. Louis from all stations on the Nickle Plate road, May 4 and 5. Ask agents.

38 May 2

Around the Lakes.

There is 19 feet of water over Corsica shoal, foot of Lake Huron. Buffalo coal dealers are offering steamboat fuel at \$2 from dock and \$2.10 from lighters.

Tonnage of the new Wolvin steamer Crescent City is 4,213.00 gross and 3,675.64 net. Her official number is 129,176.

Canadian buoys at Bar point and Big Creek, mouth of Detroit river, have been changed from red barrels to red spars.

H. J. Pauley will engage in vessel brokerage business at Milwaukee with an office in the Martin block, East Water and Wisconsin streets.

Boilers for the new Union line steamer Starucca, building at Buffalo, have just been finished by the Lake Erie Boiler Works of that place.

T. J. Elderkin of Seaman's Union fame has found a job under Chicago's new mayor. He is to be vessel dispatcher. The new harbor master is Capt. John Roberts.

Masters are requested to exercise special care in passing the middle ground at Port Huron, so as not to carry off the float lights maintained at that point by Lynn's reporting agency.

Officers of the light-house service are planning on using Pintsch gas, the same as is used in the gas buoys, for lighting Grosse point cut. The plan is to build two large crib towers at each end of the cut and equip them with tanks for storage of the gas.

In the Portage Lake ship canals, as in other waterways controlled by the government, there are rules regulating the speed of vessels. Capt. Ernest Myers of the tug B. F. Bruce is charged before the United States court, by the canal officials at Houghton, with having violated the Portage canal rules.

"Some Notes on Marine Engineering in England, Scotland and Ireland" is the title of a paper to be read by Walter Miller at the next regular meeting of the Cleveland society of engineers. Mr. Miller's paper will be simply a summary of matters that attracted his attention as a marine engineer while visiting British ship yards some time ago.

Another engineer who has a general knowledge of steel ship construction is preparing to engage in survey work and to represent owners in their dealings with ship builders. Joseph Kidd, who has been superintendent of the works of the American Steel Barge Co., at West Superior, is about to undertake consulting engineering work at Duluth.

F. W. Wheeler & Co., who have already built three or four vessels for ocean service, have closed a contract with W. G. Wilmot of New Orleans for an ocean-going steel tug. The vessel will be 140 feet long, and will have triple expansion engines of 20, 33 and 54 inches diameter, with two large boilers. Work on this vessel will begin immediately.

Managers of Duluth's three tug lines are said to have entered into an agreement that will overcome the disadvantage of tugs chasing several miles out into the lake for tows. It is not probable that vessel owners will object to an agreement that seeks to overcome this kind of competition, as with three lines in the field, Duluth towing rates will undoubtedly be reasonable.

Capt. McArthur, who was associated with Capt. McDougall for a great number of years, and who brought out the whaleback passenger steamer Christopher Columbus, has been appointed port captain at Duluth for the Northern Steamship Co. The changing of the general offices of the company from Duluth to Buffalo occasioned the change of port captain from Buffalo to Duluth.

On account of a misunderstanding between officers of the Lake Carriers' Association and the government officials regarding the care of the gas buoys in Pelee passage, which were established last season by the Canadian marine department, there has been some delay in getting these buoys to their stations, but it is now expected that they will be filled and in place during the coming week.

It is expected that the steel barge W. LeBaron Jenney, which is being built by F. W. Wheeler & Co. of West Bay City for the Bessemer Steamship Co., will be launched during the present week. The tug Industry, built by Capt. James Davidson of West Bay City, is also practically finished. She goes to Duluth to engage in harbor towing under the direction of Barry Bros. Capt. Davidson will also launch, within a few days, one of the big wooden schooners which he has had under construction during the winter.

"English as She is Spoke" in Genoa.

A sample of "English as she is spoke" in Genoa, Italy, has just been received at the office of Pickands, Mather & Co., Cleveland. The enterprising manager of a union of mooringmen in far-off Italy has evidently found the names of vessels of the Minnesota Steamship Co. in one of the British or French classification registers, and assuming that these vessels engage in commerce in all parts of the world, he has addressed the following circular to the late Col. James Pickands, whose name was found as president of the steamship company:

"Messrs. James Pickands, Minnesota S. S. Co.—Dear Sir: Union of the old mooring men of the port of Genoa. Of an ancient fondation, whose lugagments, till today, have always been to pay attention to the moorings and unmoorings of steamers, of all English and other stranger National Companys in arrival in the said port, beg to offer you a reduction of rates already applied in the present service: Moorings with cables and chains Fr. it. 25 (twenty-five); Unmoorings with cables and chains Fr. it., 25 (twenty-five); Moorings with anchor at a poop, Fr. it., 30 (thirty); Unmoorings with anchor at a poop, Fr. it., 30 (thirty). Hoping that no interference of persons not well known and incapable will contest to her the ancientness of union service, she shall, always be disposed, at all events, to engage herself by taking all precaution disposing ferrys, and a sufficient number of employeds under the overlooking of the respective agents and representatives of companys which have knowledge enough to give the requested information. Trusting to your orders, we remain sir," etc., etc.

Foreign Orders for Ship Yard Tools.

Neary all of the ship builders on the lakes, as well as the principal companies in the east, are arranging for an extensive increase in the use of pneumatic tools on hull work. The business developed in tools of this kind by the Chicago Pneumatic Tool Co. is wonderful. The Review is in receipt of a letter from this company saying that they received a cable, Tuesday, from one firm in England for sixteen of their No. 2 Boyer hammers and twenty drills. Other orders are for three Boyer hammers from Torino, Italy; four from Moscow, Russia; five from Copenhagen, Denmark, and three from Vienna, Austria; also an order from Vienna for a piston drill. Letters have also been received stating that these machines are giving perfect satisfaction in England, and the Chicago manufacturers have a standing order to ship twenty hammers and twenty drills each month to one firm in London. They are running two-thirds of their machinery twenty hours out of twenty-four and are increasing their shop capacity by putting in six special machines.

Trade Notes.

A new type of steam steerer made by the Chase Machine Co., of Cleveland, is to be fitted to four of the Cleveland Tug Co.'s tugs.

Randolph & Clowes, Waterbury, Conn., have leased the building 98-100 Purchase street, Boston, and will at once occupy it as a Boston branch, warehouse and office, carrying a full line of seamless tubing, sheet copper, sheet brass, brazed tubing, brass rod, etc. The establishment will be in charge of W. B. Maynard.

With the opening of navigation it is anticipated that changes will be made among engineers of steam vessels, and the Roberts Safety Water Tube Boiler Co. of Cortlandt street, New York, which has about a thousand boilers in use on steam vessels of all kinds throughout the country, announces that they will endeavor to assist any engineer who may, on account of these changes, be placed in charge of a Roberts boiler for the first time. A full set of their descriptive and instruction circulars will be sent to any engineer applying for the same and giving his full name and address. There will be no charge and no stamps will be required.

From its St. Petersburg office, the Buffalo Forge Co., Buffalo, N. Y., recently received an order for two engines of the enclosed type, running in oil. Both are of the same size (8 x 10), and they are to be shipped to St. Petersburg, Russia. These engines will be used for electric lighting. A note from the Buffalo office of the company says that the demand for engines of this kind is steadily growing, especially in foreign markets. Little effort has been made to secure business from foreign sources, the orders received having come almost voluntarily as a result of prospective purchasers having inspected other installations before buying.

During May the Nickel Plate road will inaugurate an improved passenger train schedule of three solid through trains daily. In addition to the through vestibuled sleeping car service between Chicago, Buffalo, New York and Boston, via the West Shore and Fitchburg railroads, a daily New York sleeper will be placed in service via the D. L. & W. R. R.

26-Apr-30.

Chas. E. & W. F. Peck,
58 William St.
NEW YORK CITY.
C. T. BOWRING & CO.,
5 & 6 Billiter Ave., E. C.
LONDON, ENG.

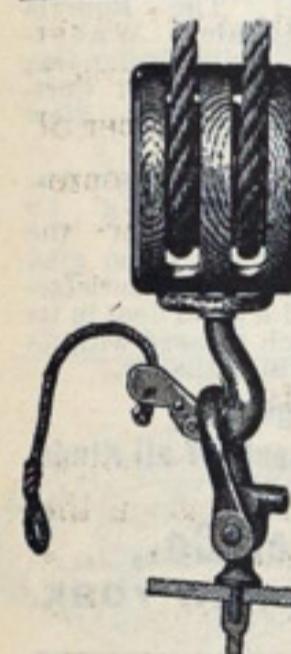
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BROWN & CO.,
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Are prepared to make rates on all classes of Marine Insurance on the great lakes, both CARGOES and HULLS.

"GREAT LAKES REGISTER."

F. D. HERRIMAN, Surveyor-General, Chicago, Ill.



STANDARD AUTOMATIC RELEASING HOOK

For NAPTHA LAUNCHES and boats
of all sizes and descriptions.

Will release a boat immediately in
the roughest sea or under speed and
can be hooked on without delay or
injury to the hands of men hooking
it on. For further information apply to

STAND'T AUT. RELEAS'G HOOK CO.,
22 and 24 State Street, New York.



UNITED STATES ENGINEER OFFICE,
Telephone Building, Detroit, Mich., April
17, 1897. Sealed proposals for Dredging Black
River, at Port Huron, Mich.; Bar at mouth of
Black River, Mich.; Belle River, at Marine City,
Mich.; and Clinton River, Mich., will be re-
ceived here until 12 o'clock noon (Standard
time) May 7, 1897, and then publicly opened.
Apply here for information. G. J. LYDECKER,
Lt. Col., Engrs.

May 1

The Bessemer Steamship Company

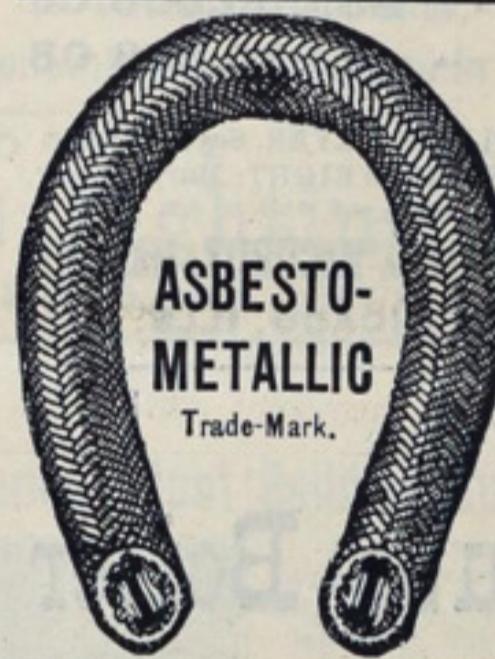
Solicits Catalogues, Prices and Discounts from manufacturers and
wholesale dealers in Ship Machinery, Brass Goods, Rope, Paints,
Asbestos, Packing, Hose, Furniture, Piping, Glass and Crock-
ery, Tinware, Ranges, Carpeting, Bedding, Life-preservers, Rafts
and Boats, Engineers' Supplies and Tools, Carpenters' Tools, Elec-
tric Supplies, Lamps, Grate Bars, Castings, etc., etc., etc.

ALSO QUOTATIONS from Market men and Grocers on the Lakes for
Provisions and Meat, best quality only.

CATALOGUES without quotations are not wanted.

ALL GOODS except provisions to be delivered in Cleveland.

Address L. M. BOWERS, General Manager,
CLEVELAND, OHIO.

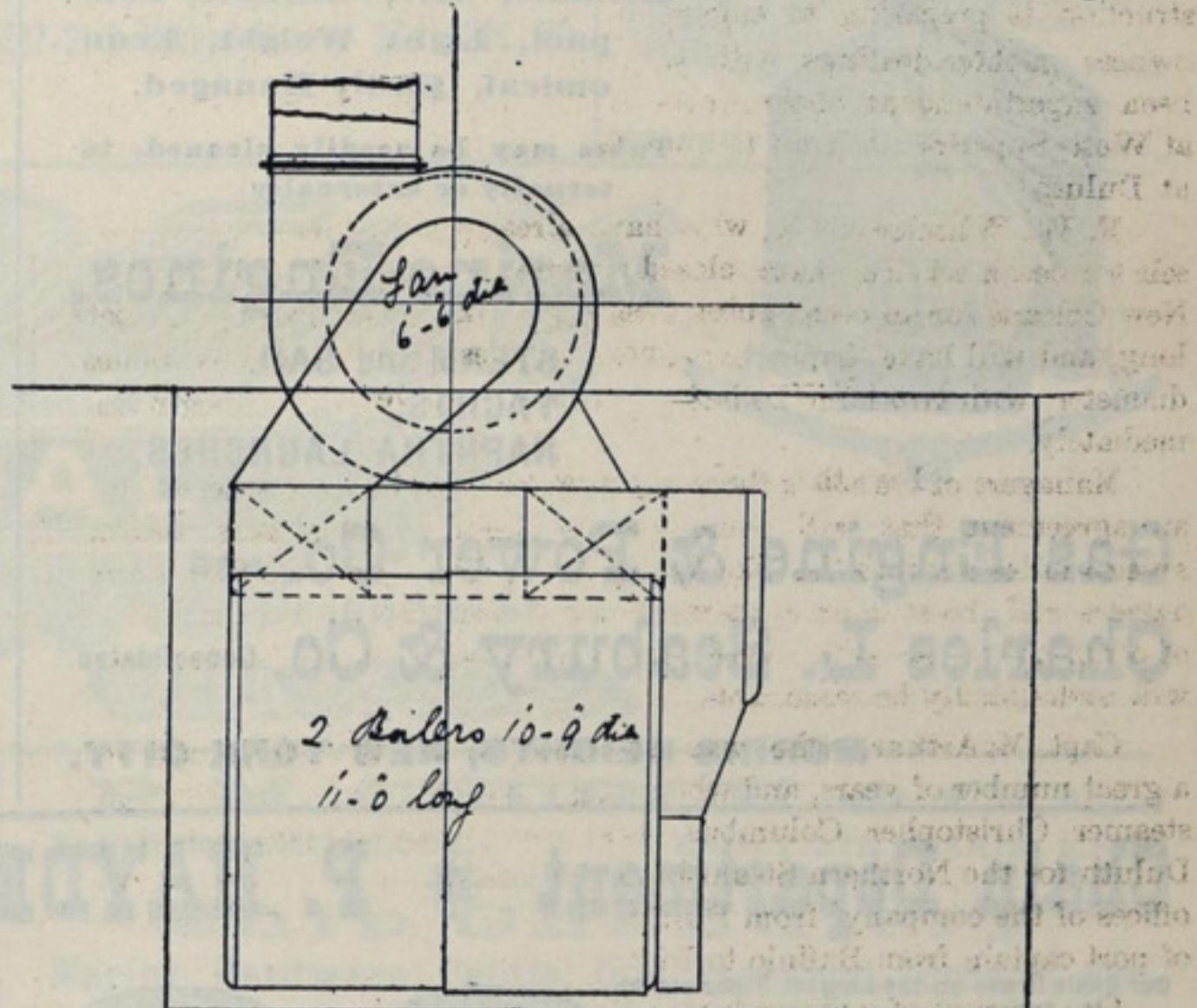
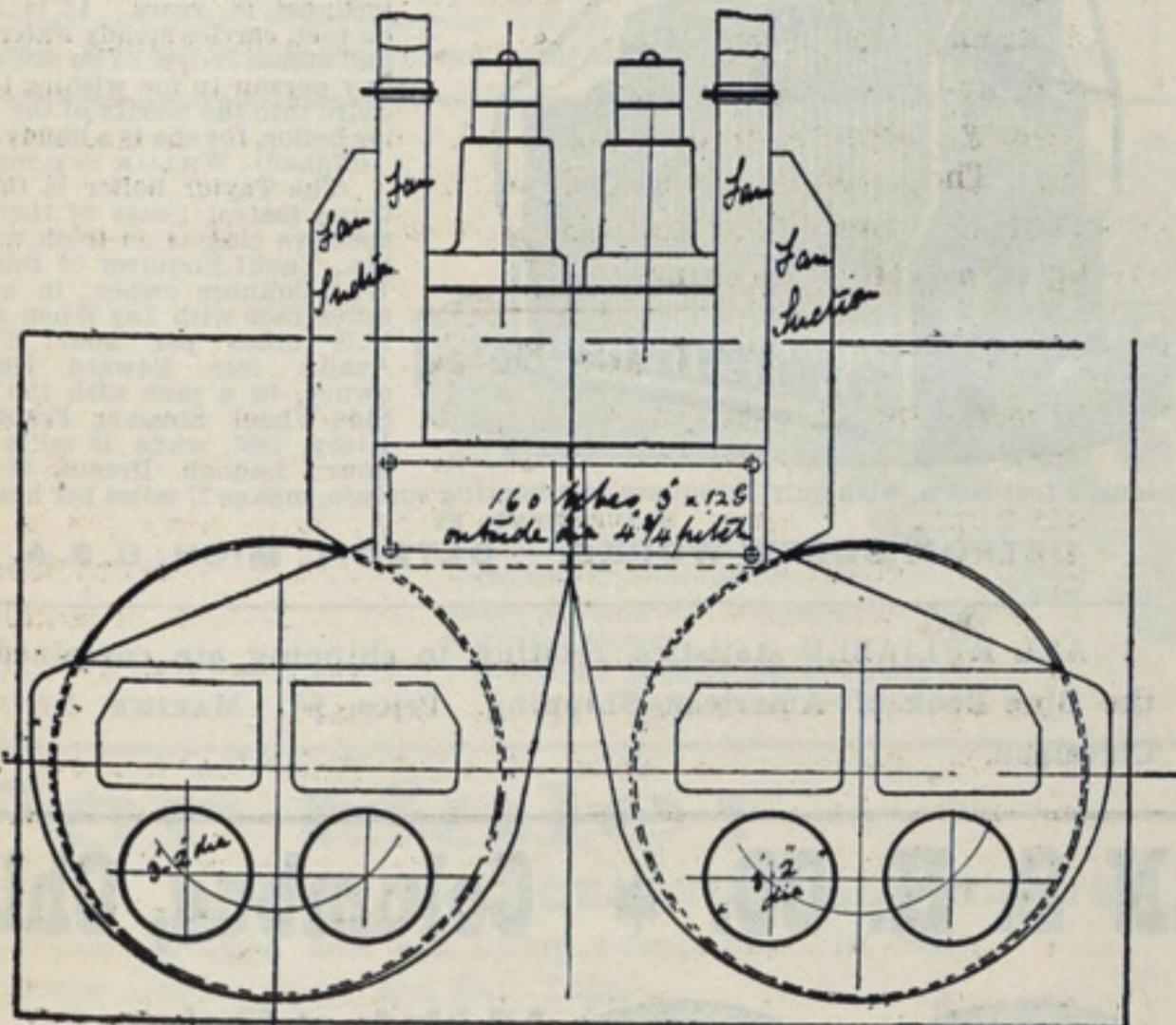


Lucky is the Engineer Who Uses ASBESTOS METALLIC PACKING

It is in use on more lake steamers
than any other, because it meets
the requirements.

AMERICAN STEAM PACKING CO.,
Original Manufacturers of
PISTON PACKINGS,
60 Federal St., BOSTON, MASS.

The Ellis & Eaves Induced Draft--Serve Ribbed Tubes



DRAWING SHOWING PLAN FOR ADDING THE ELLIS & EAVES DRAFT TO LAKE STEAMERS.

THIS SYSTEM OF DRAFT, WITH THE SERVE TUBES, SAVES MONEY.

S A V E S
A \$ \$ \$ A
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S A V E S

25 PER CENT OF YOUR FUEL BILLS.

40 to 50 PER CENT BOILER CAPACITY.

THE LIFE OF THE BOILER BY DRAWING GASES THROUGH TUBES.

FIREMEN AND INCIDENTALLY THEIR WAGES.

CARGO SPACE BY USING A SMALLER NUMBER OF BOILERS.

For PARTICULARS and PRICES of applying to Steamers already Built and to Steamers Building, apply to

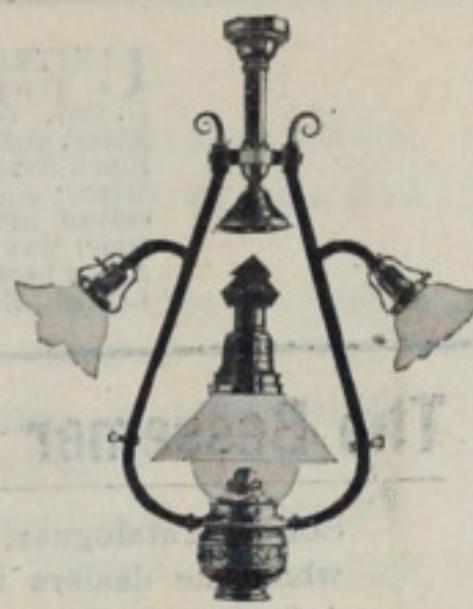
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MARINE LAMPS



Oil and Electric
Equipment for
Steamships,
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Signal Lights,
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CAPITAL, Paid up in Cash, . . .	\$3,000,000.00
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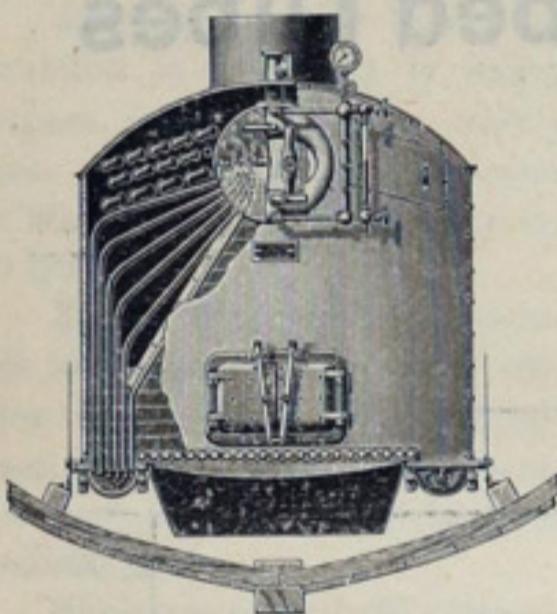
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Lake Marine Department.

SEABURY'S Safety Water Tube Boiler

For Steam Yachts and Launches.



Reliable, Safe, Durable, Compact, Light Weight, Economical, Easily Managed.

Tubes may be readily cleaned, internally or externally.

Marine Engines,

STEAM and SAIL
YACHTS,
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**Gas Engine & Power Co. and
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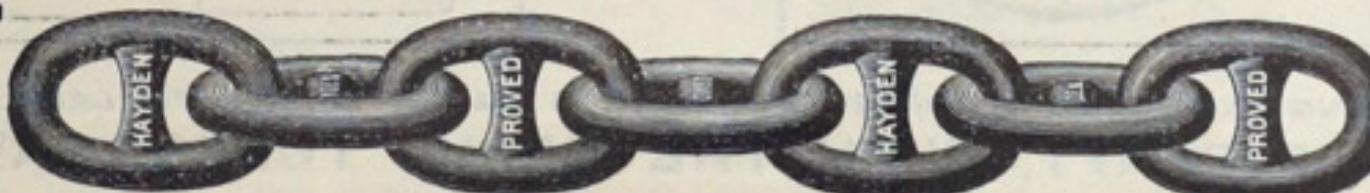
MORRIS HEIGHTS, NEW YORK CITY.

Chain Department * P. HAYDEN S. H. CO. * Columbus, Ohio.

Our Chain in use on the Largest Steamers on

the Lakes:

The Zenith City, Victory,
North West and North Land,
and many others.



All kinds of Chain—
Stud and Close Link,
Cable Chains.
Write for Prices.

PRATT & WHITNEY CO., Hartford, Conn.

Machinery and Tools for Marine Engine Shop Equipments.

Small Tools. Stay-Bolt and Stay-Tube Taps a Specialty. Standard Gauges and Reamers.

NEW YORK, 123 LIBERTY ST.

CHICAGO, 42 AND 44 SO. CLINTON ST.

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G. H. FOSTER, Prest. MARK H. HANLON, V.-Prest. & Secy. W. H. WARNER, Treas.
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The Inter-Ocean Coal & Coke Co.

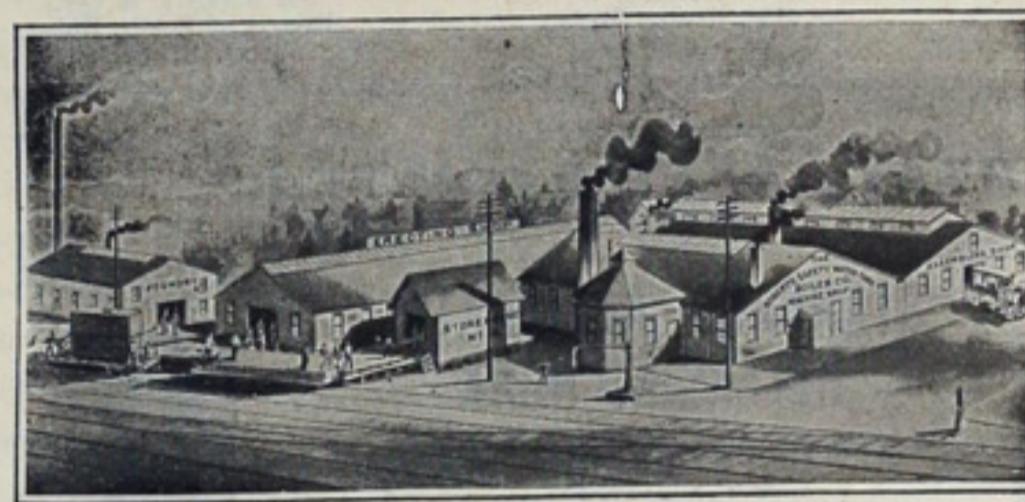
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PRODUCERS AND SHIPPERS.

Choicest Grades of YOUNGIOGHENY COAL FOR STEAMBOAT FUEL.

Lighter in Cleveland Harbor of 400 tons capacity.

CLEVELAND DOCKS, just north of Main Street bridge.
SAULT RIVER DOCK, just above Detour, known as Watson dock



Office of
AMERICAN
STEEL BARGE
CO.

West Superior
Wis.,
Oct. 31, 1896.

The Roberts
Safety Water-
Tube Boiler Co.,
39 and 41 Cort-
landt St., New
York.

Gentlemen:
Replying to
yours of the
28th I am glad
to say that the boiler you furnished us for tug "ISLAY" is giving entire satisfaction.
I have heard no complaint about it whatever, but have heard a good deal in its favor. I ride on the boat frequently and must say that I am much pleased with its work. Very Truly yours,
Alexander McDougall, General Manager.

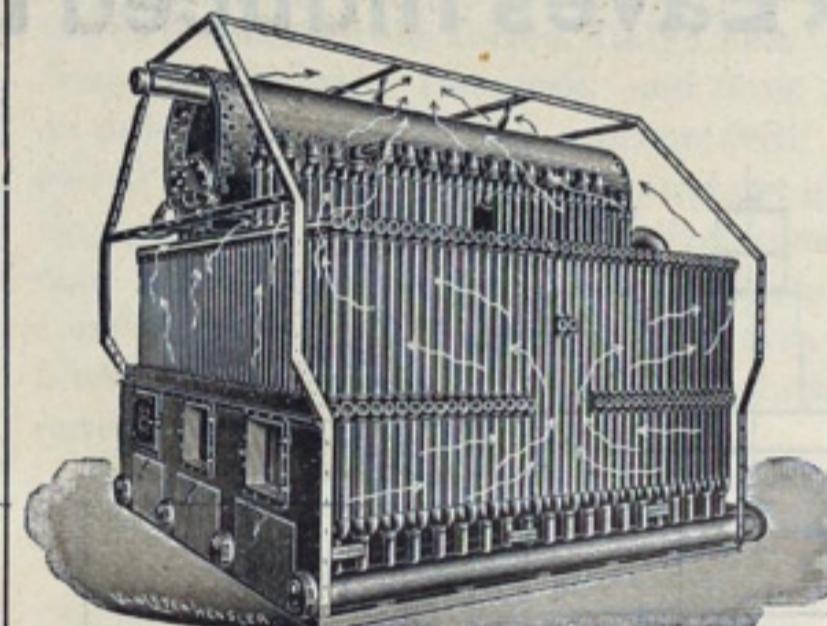
THE ROBERTS BOILER is the Cheapest, Best and Lasts Longest.

Adapted for use in Yachts, Launches, and Vessels of all Kinds.

Handsome Illustrated Circular sent free on application to

The Roberts Safety Water Tube Boiler Co.,
WORKS, RED BANK, N. J. 39 & 41 Cortlandt St., NEW YORK.

TAYLOR PATENT UPRIGHT WATER TUBE BOILER.



Chief Engineer Skelton of Steam Yacht Enquirer writes: "I can honestly say, that the Taylor boiler is the best boiler I ever handled, and I have been in the business 18 years. It is light on fuel, carries steady water line and steam is dry. You can refer any person to me wishing to inquire into the merits of the Taylor boiler, for she is a dandy."

(Signed) WILLIAM SKELTON, Jr.

The Taylor boiler is in the three fastest boats of their respective classes on fresh water, viz., Yacht Enquirer of Buffalo, W. J. Connors owner; in a 29 1/2 miles race with Say When made 18.78 miles per hour; Yacht Azalia, late Edward Henkel owner, in a race with the fast Side-Wheel Steamer Frank E. Kirby, 1896, made 18 miles per hour; Launch Dream, 63 feet long, 9 feet beam, with only 350 square feet heating surface, makes 17 miles per hour.

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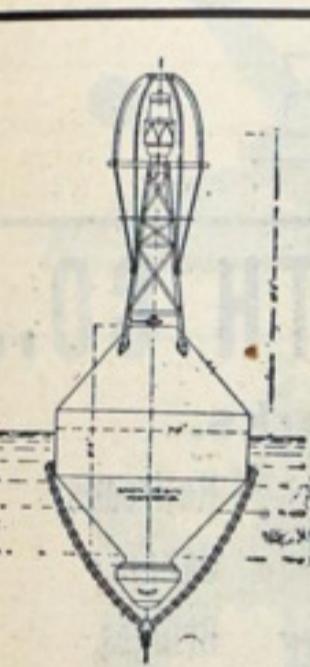
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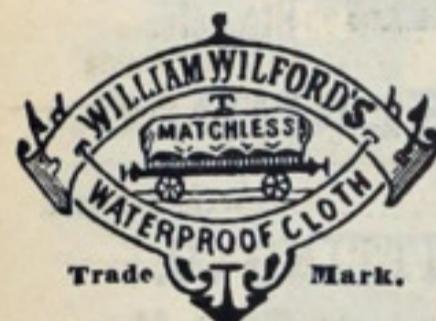
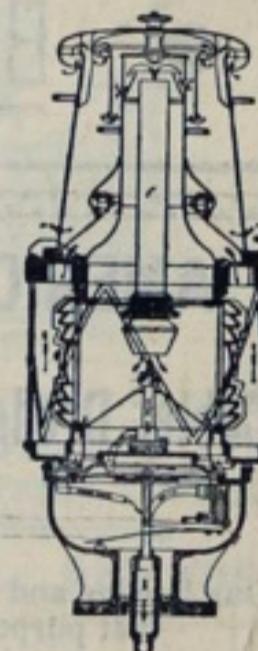
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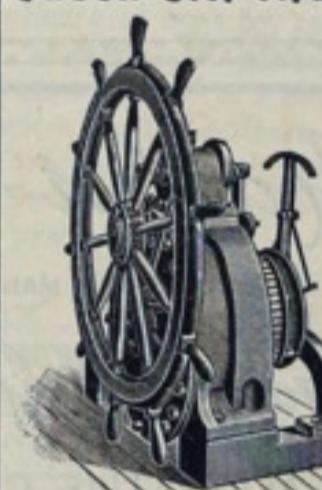
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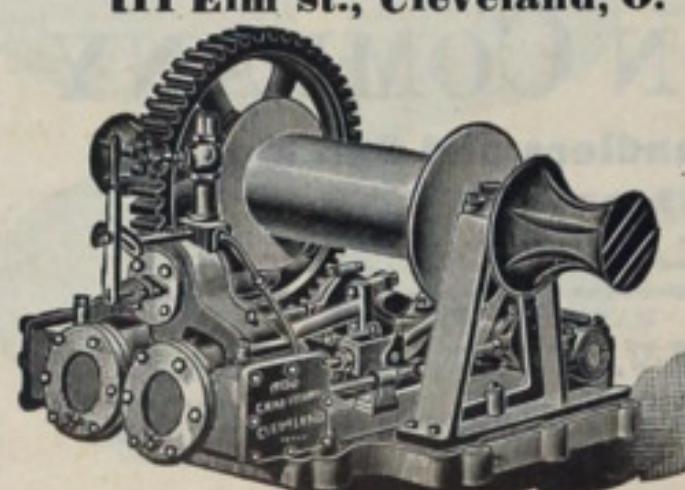
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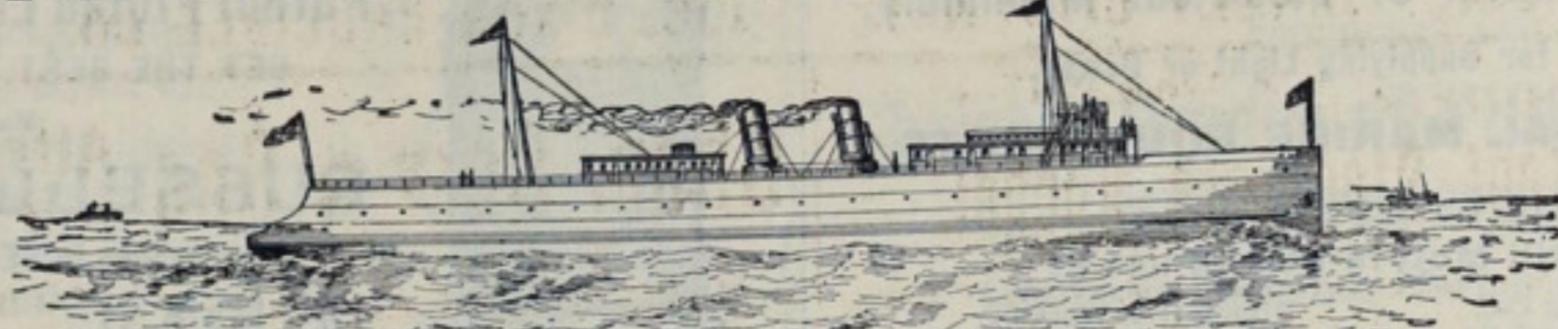
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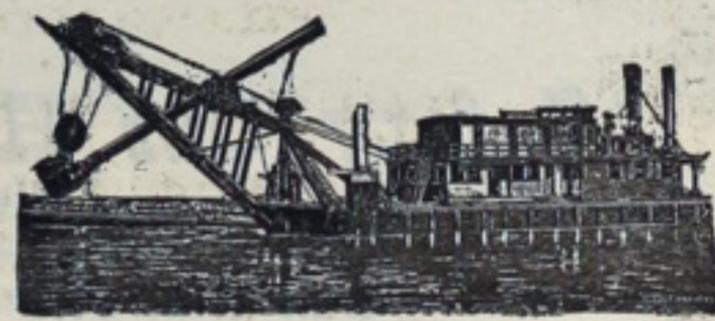
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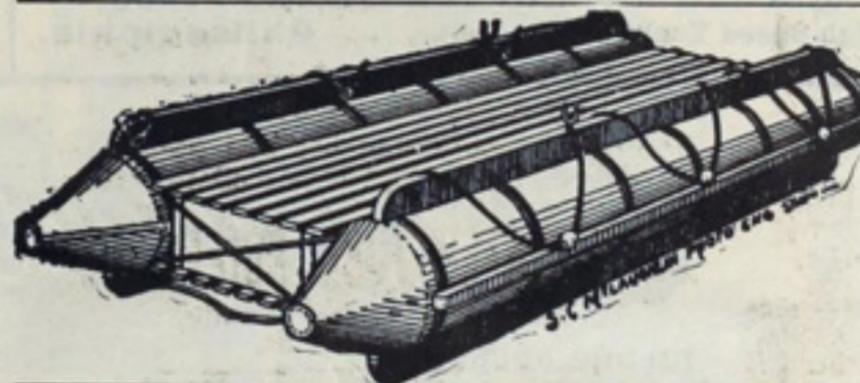
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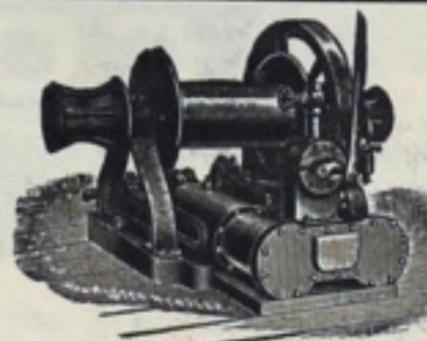
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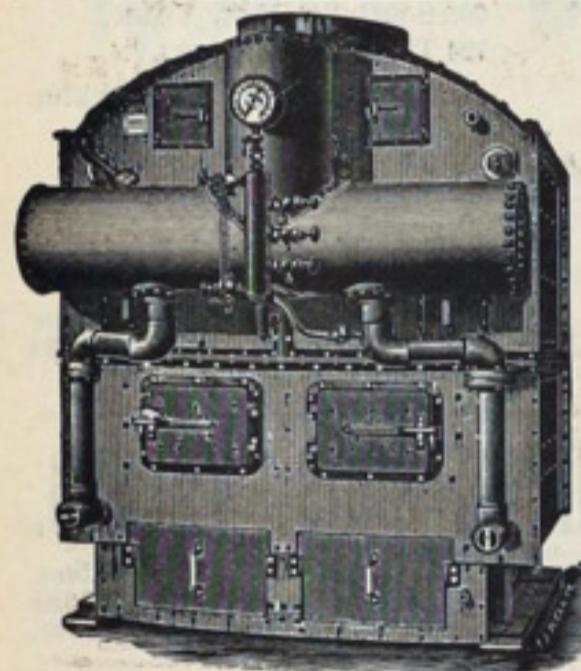
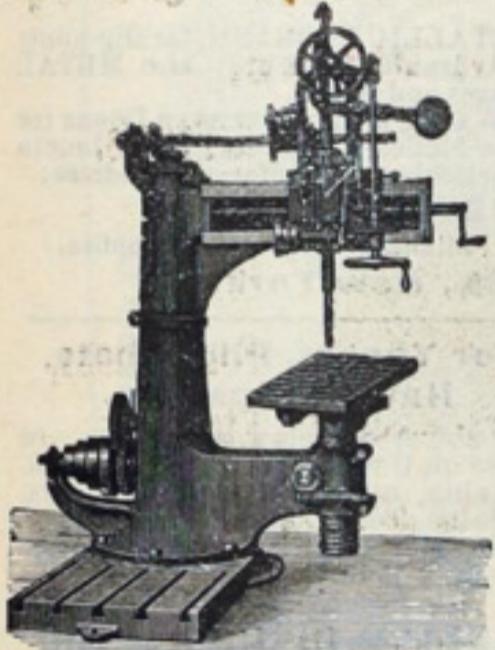
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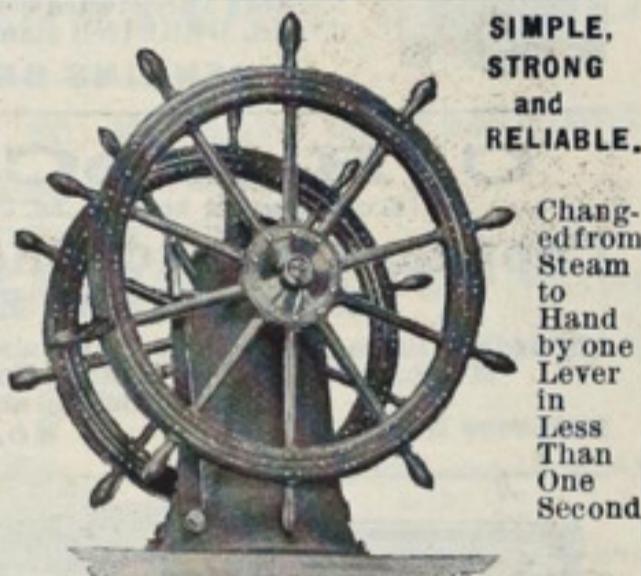
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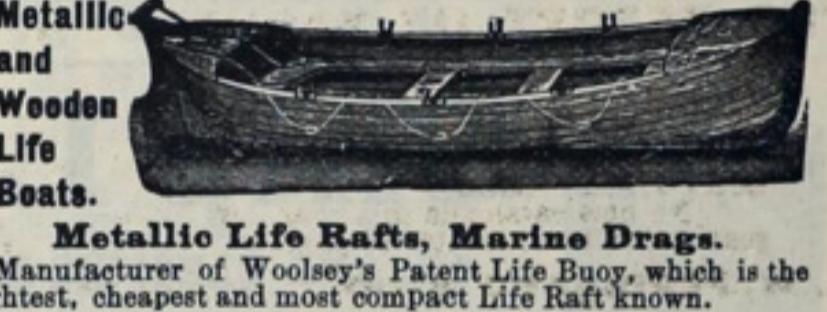
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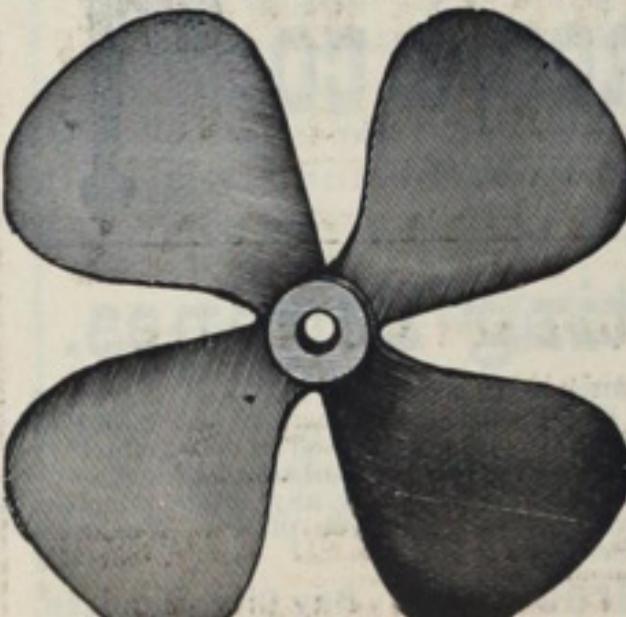
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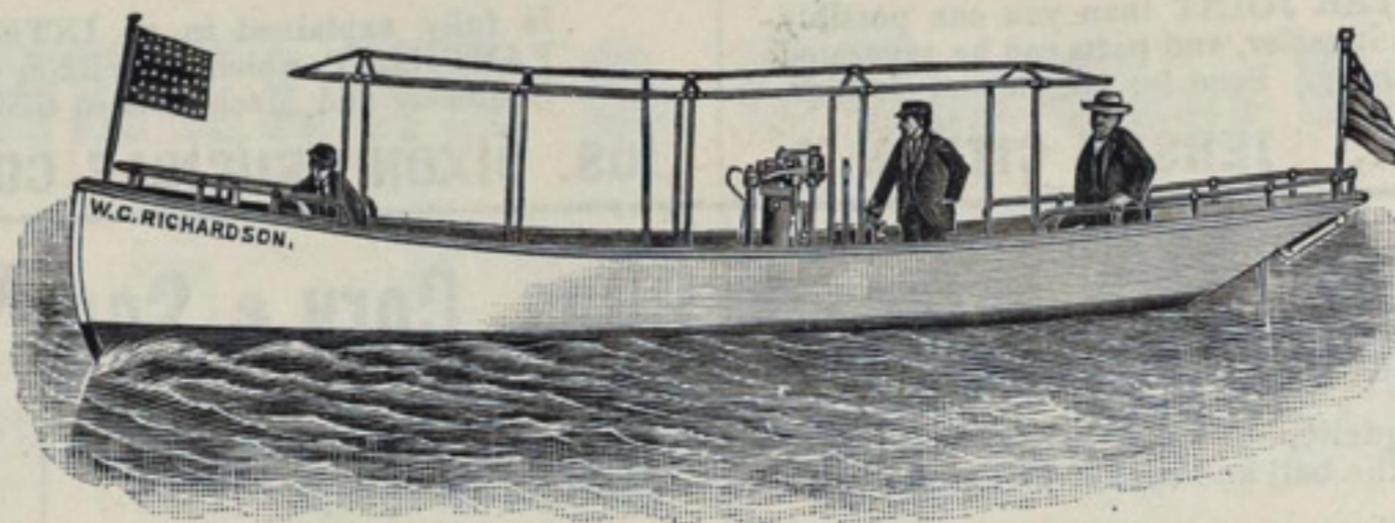
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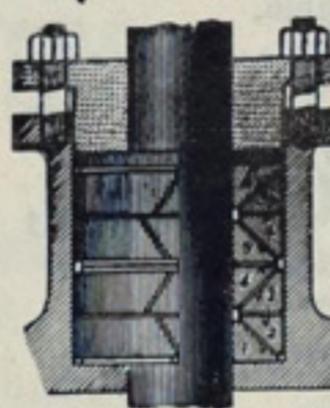
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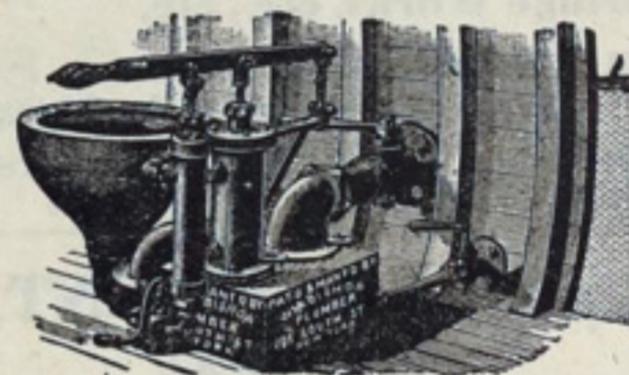
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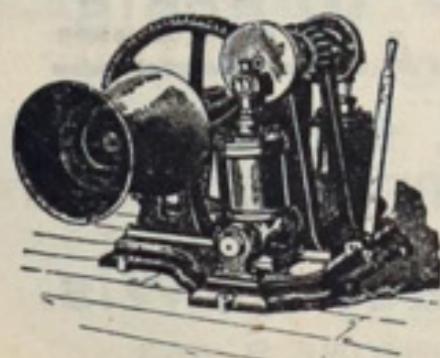
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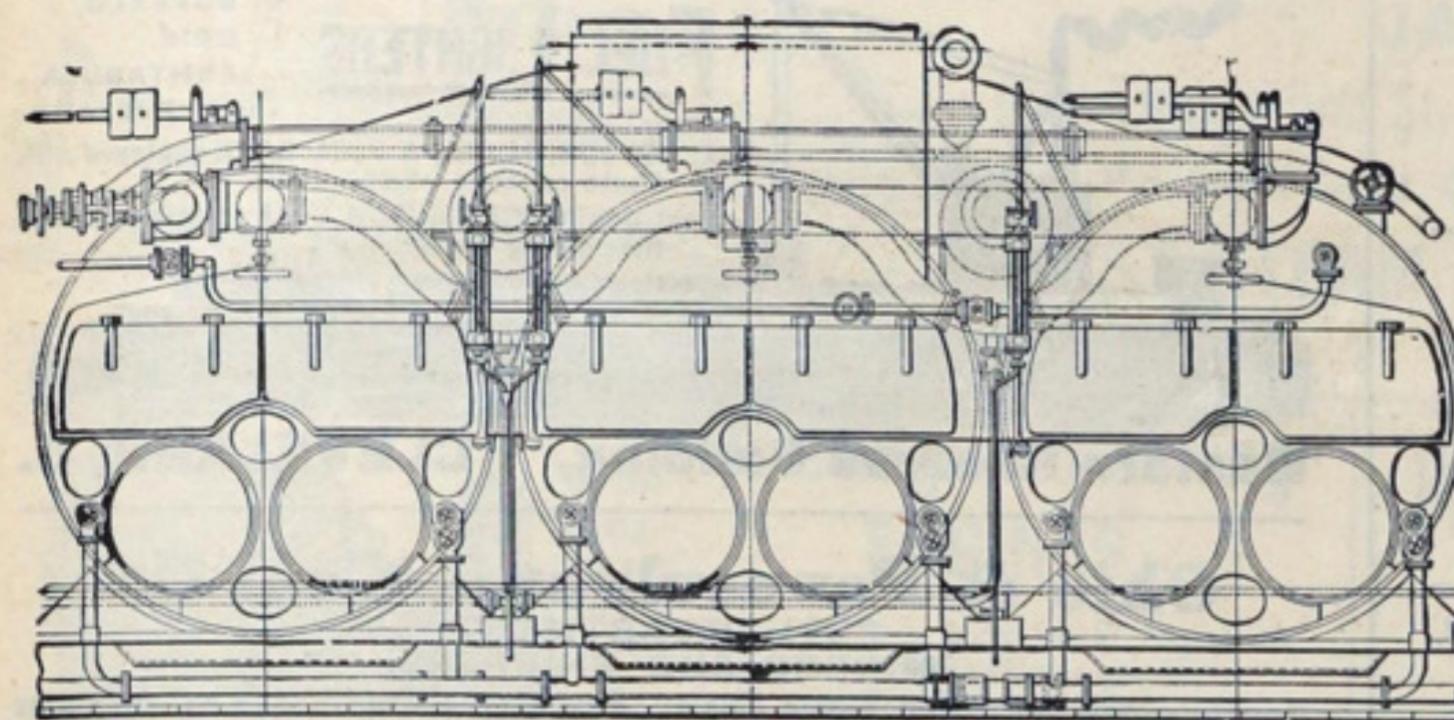
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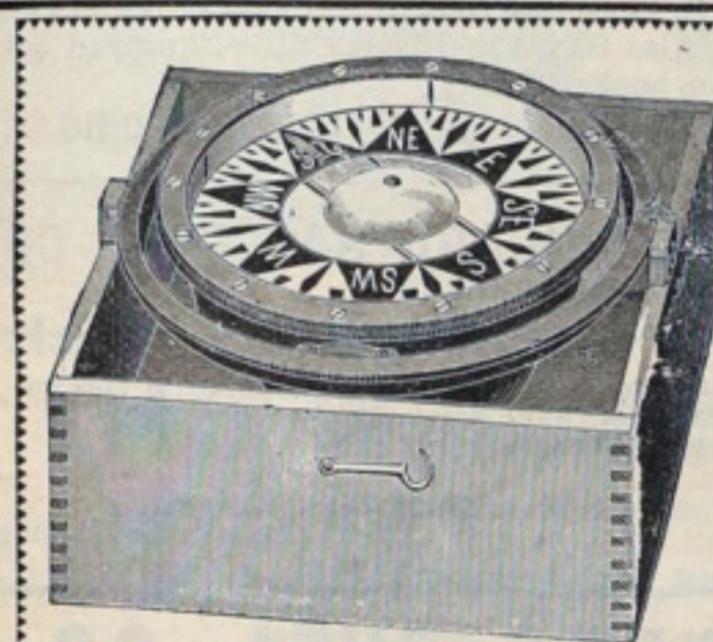
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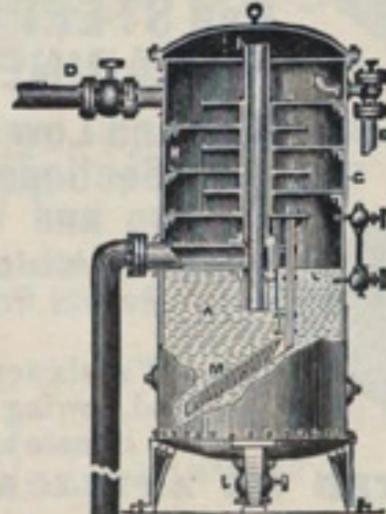
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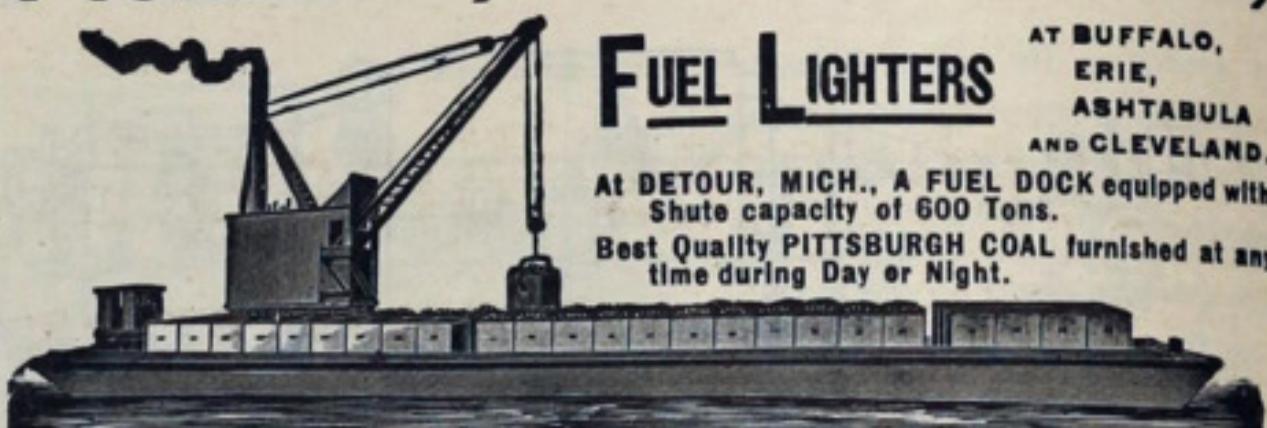
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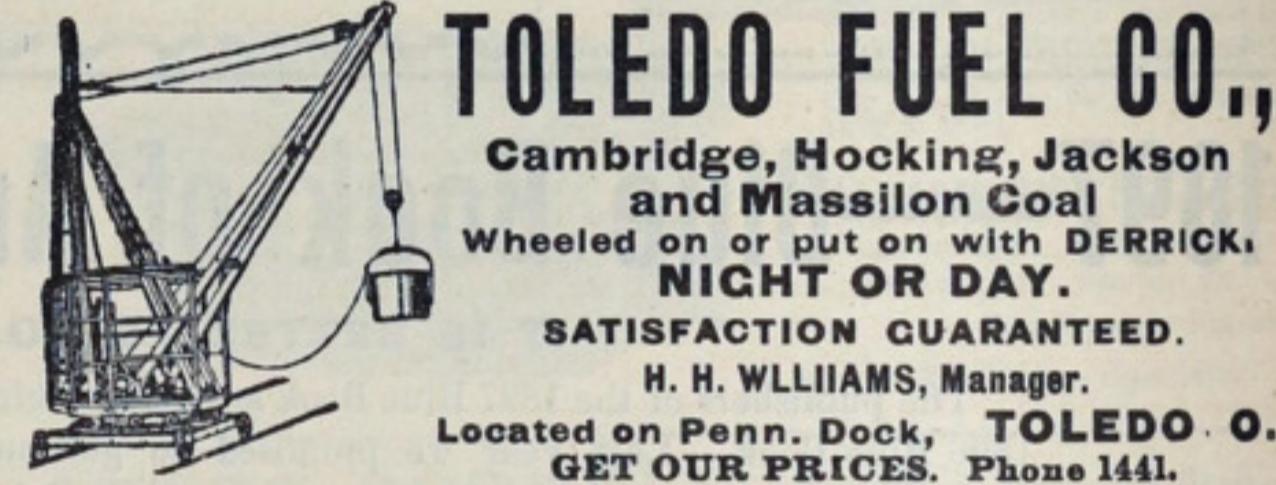
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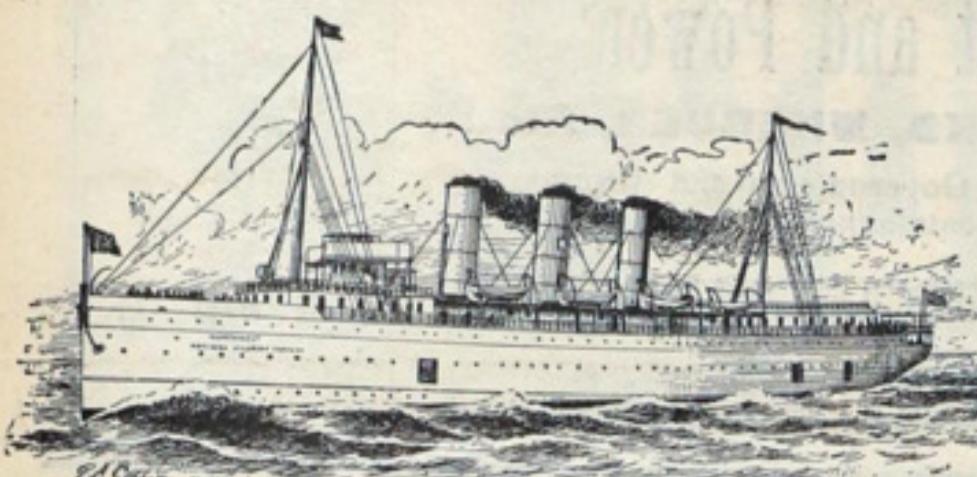
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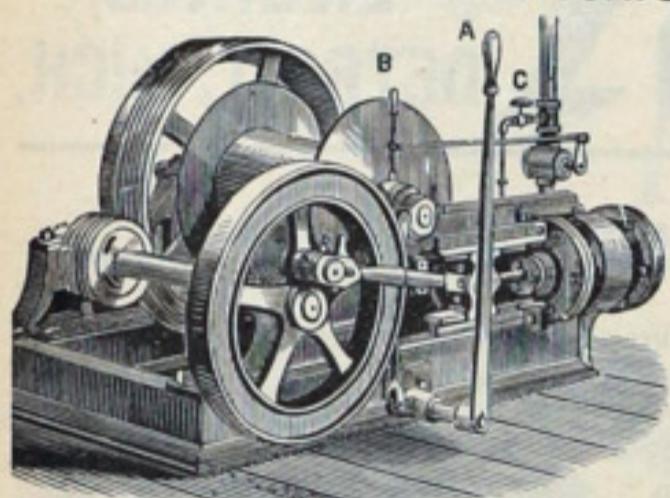
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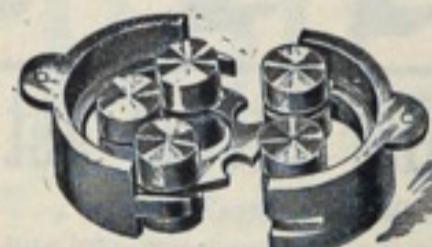
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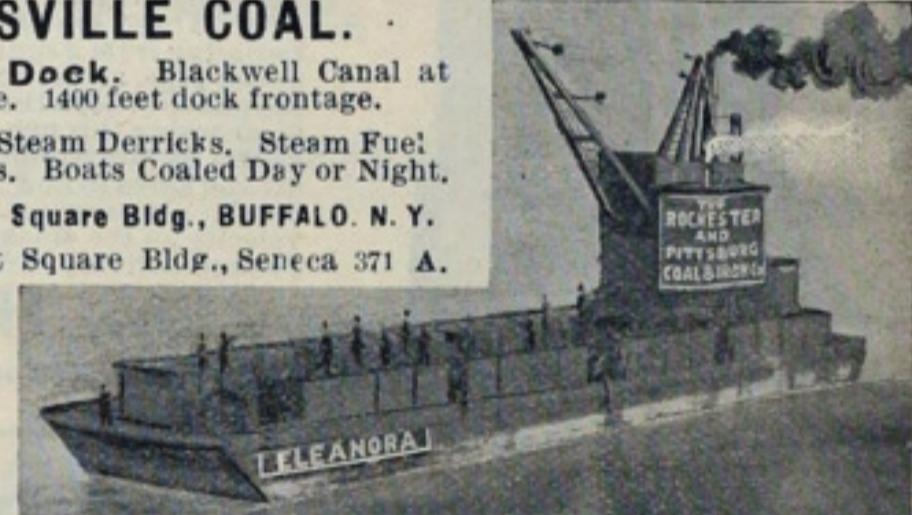
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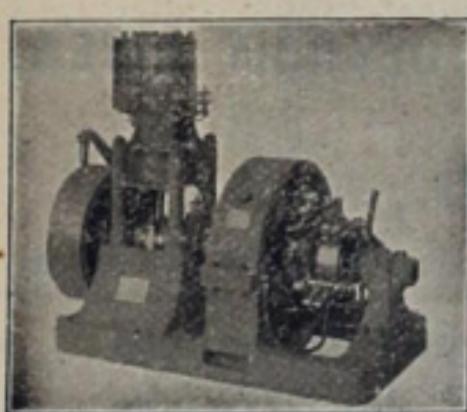
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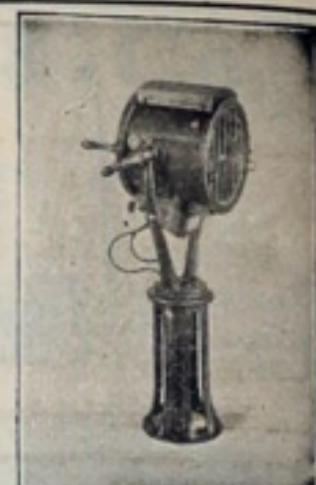
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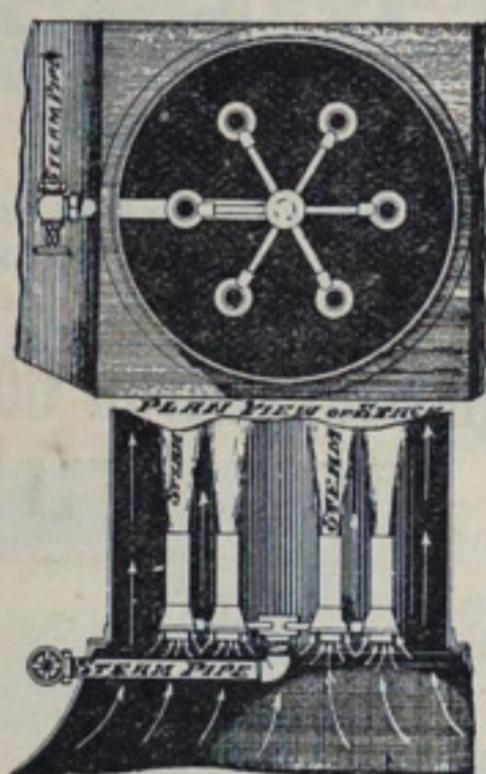
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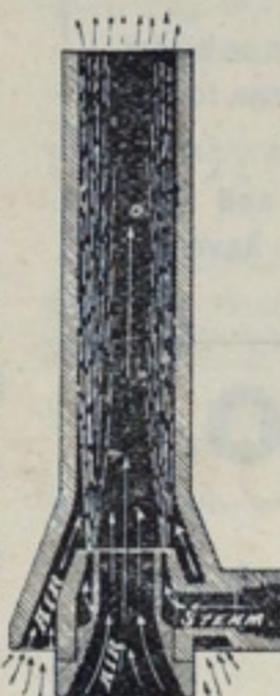
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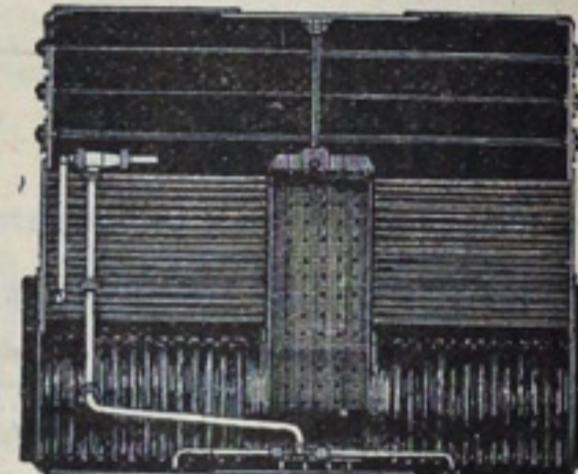
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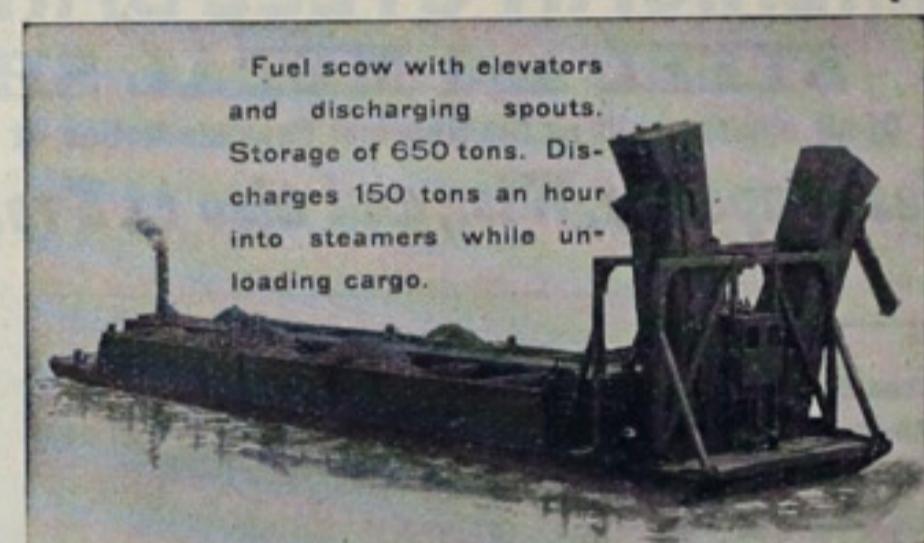
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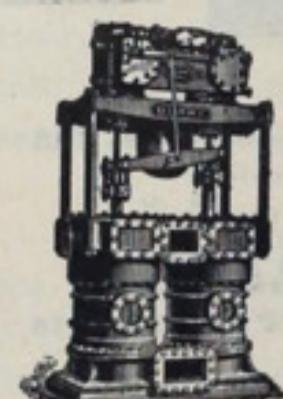
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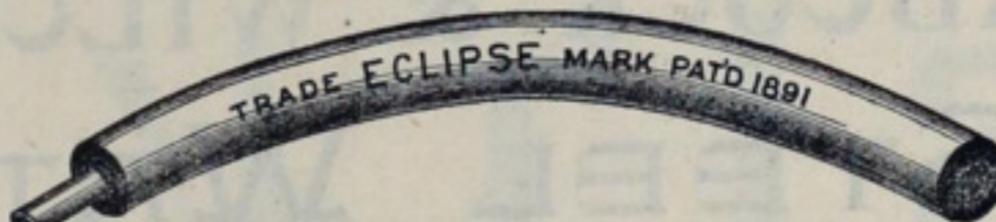
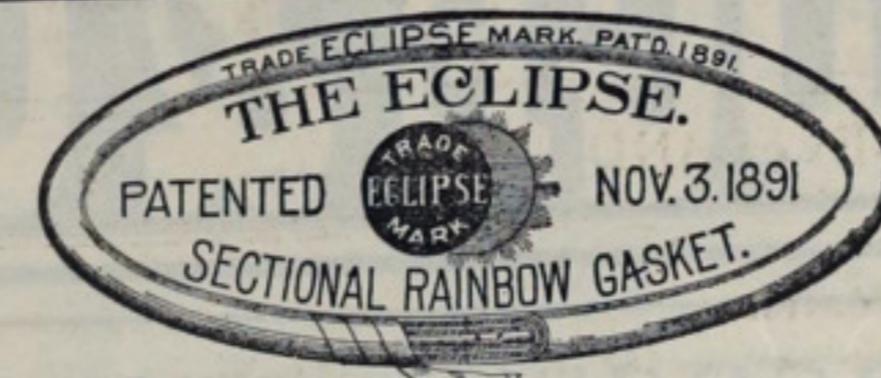
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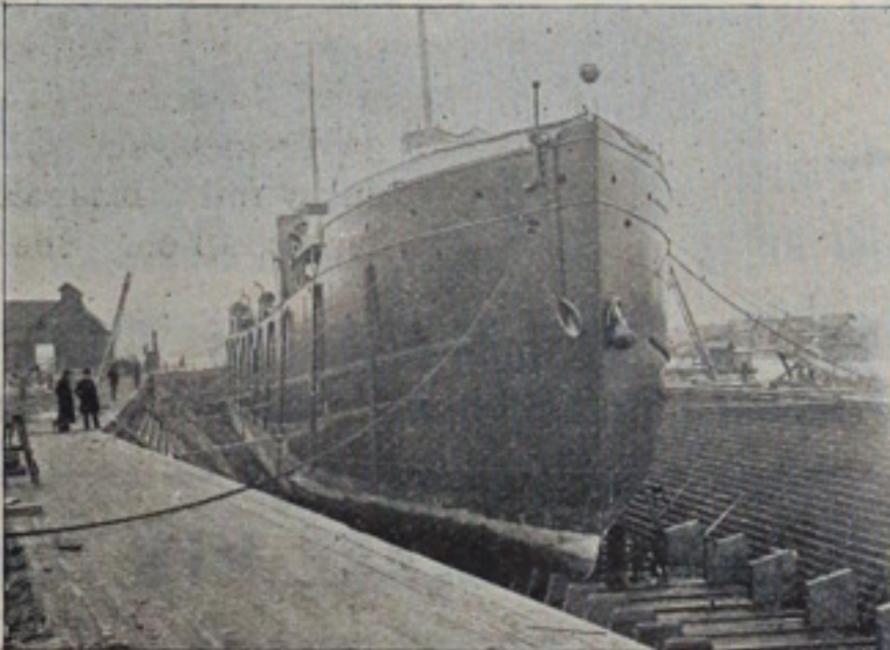
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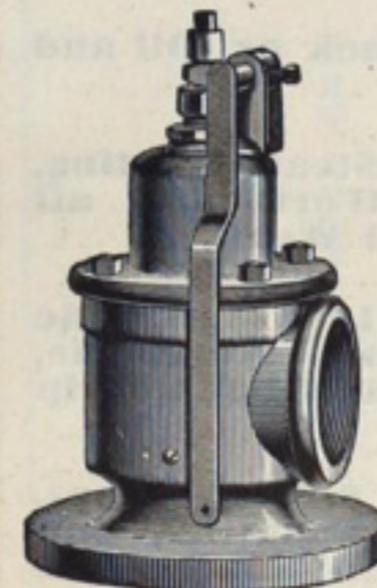
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